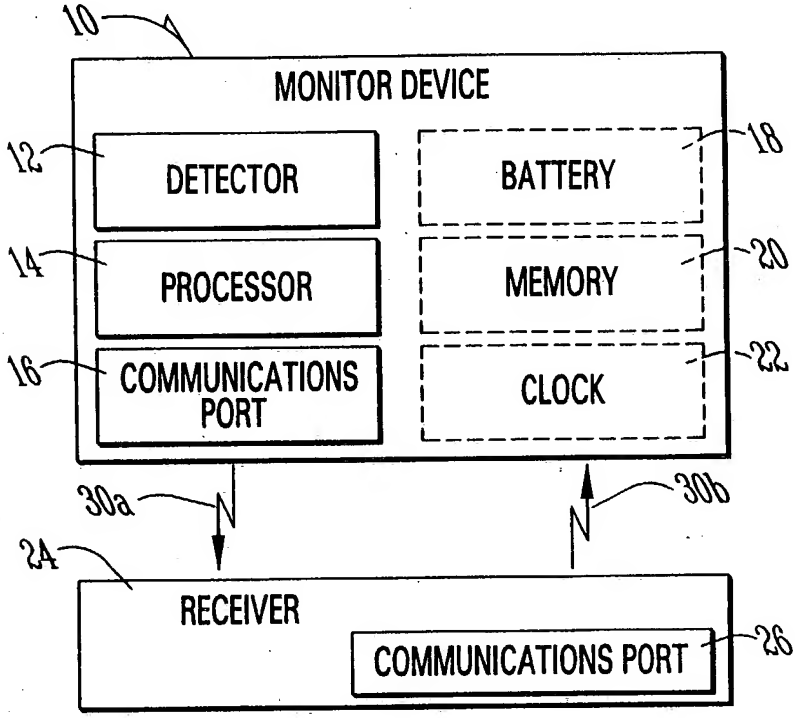
10
MONITOR DEVICE
12
DETECTOR
14
PROCESSOR
16
COMMUNICATIONS PORT
18
BATTERY
20
MEMORY
22
CLOCK
30a
30b
24
RECEIVER
26
COMMUNICATIONS PORT

FIG. 1

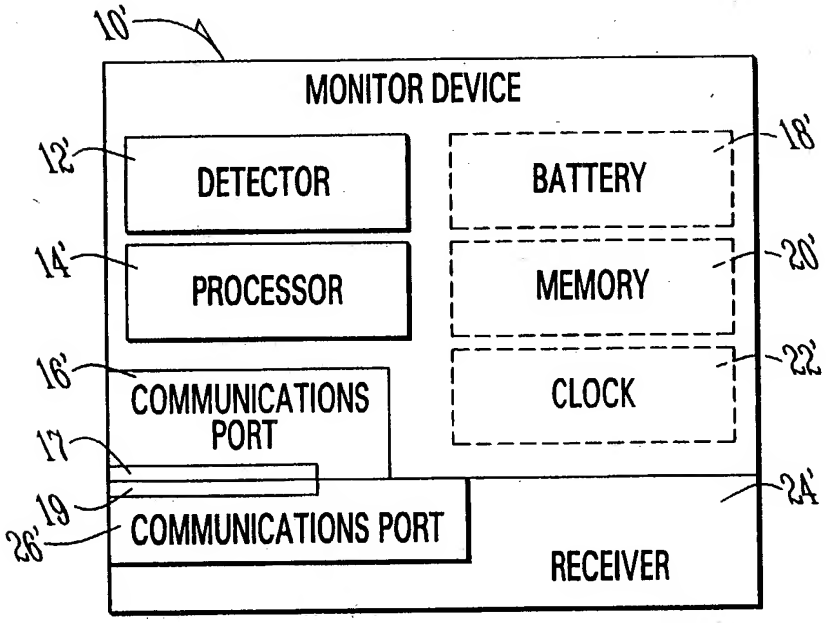
10'
MONITOR DEVICE
12'
DETECTOR
14'
PROCESSOR
16'
COMMUNICATIONS PORT
17
19
26'
COMMUNICATIONS PORT
18'
BATTERY
20'
MEMORY
22'
CLOCK
24'
RECEIVER

FIG. 1A

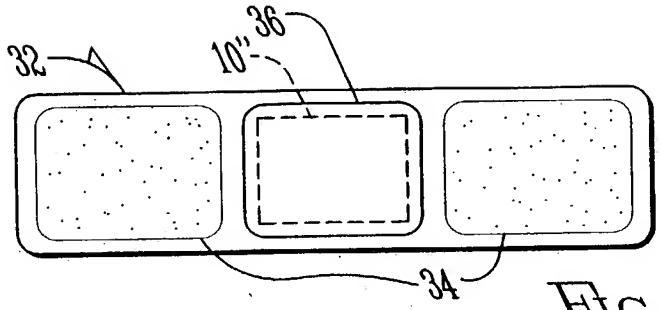

FIG.2

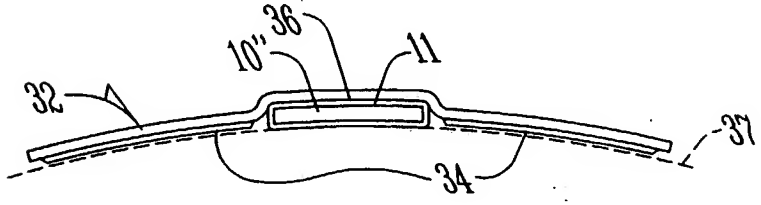

FIG.2A

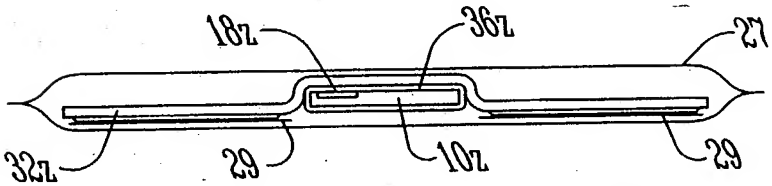

FIG.2B

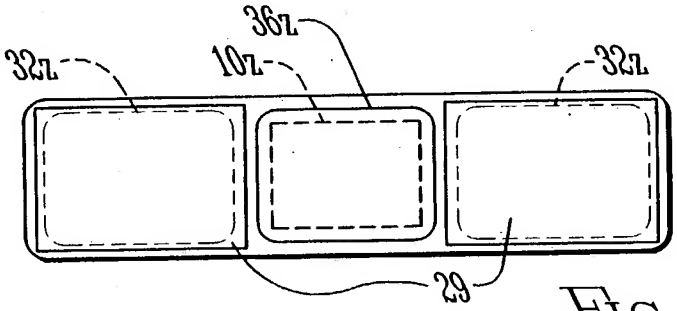

FIG.2C

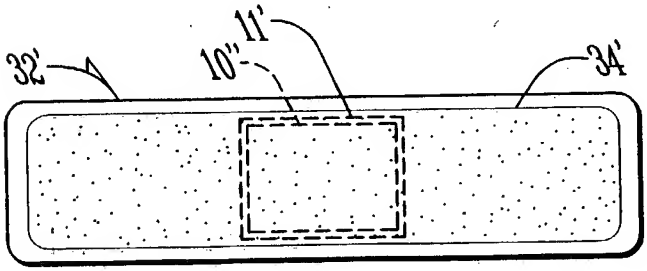

FIG.2D

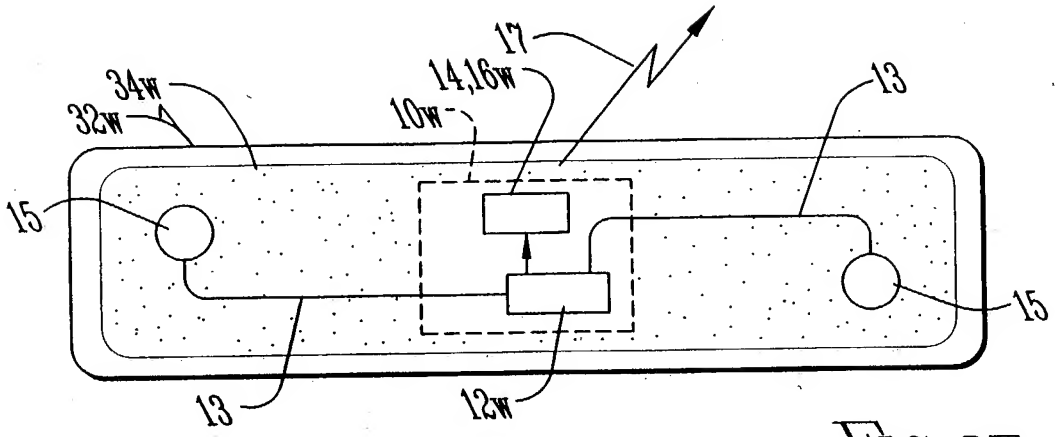

FIG.2E

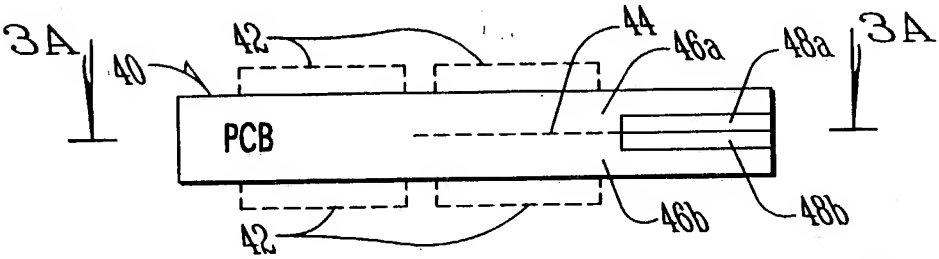

FIG.3

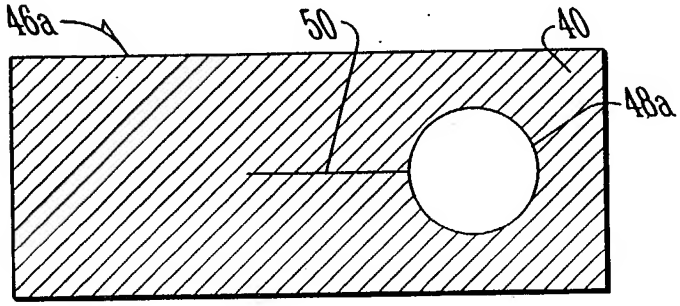

FIG.3A

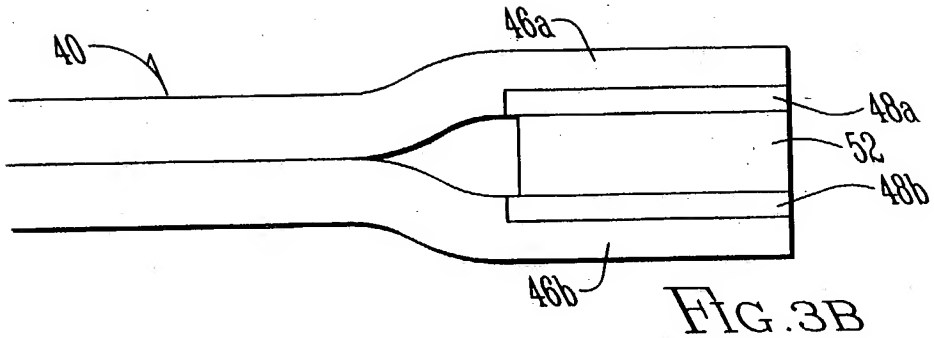

FIG.3B

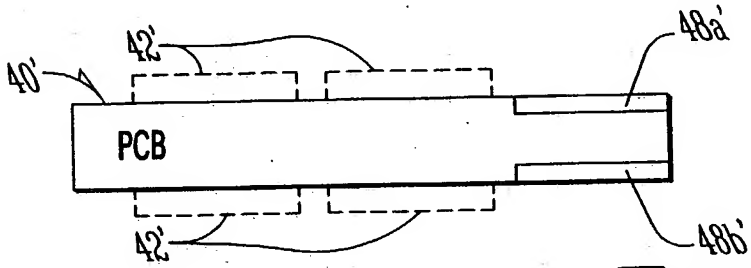

FIG.3C

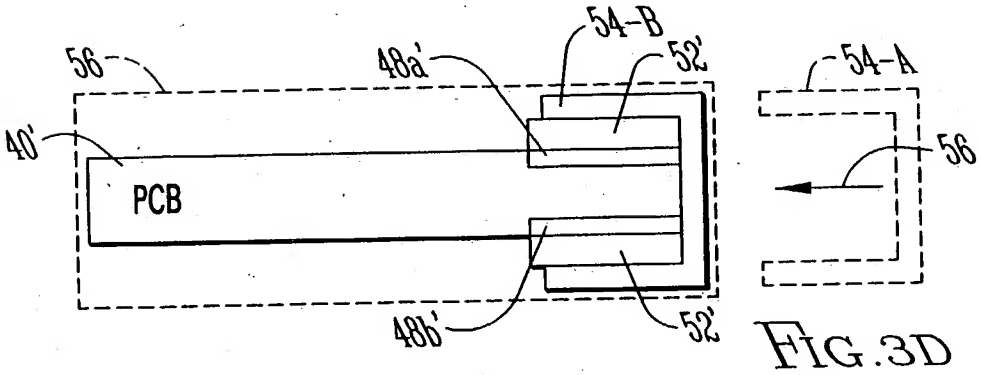

FIG.3D

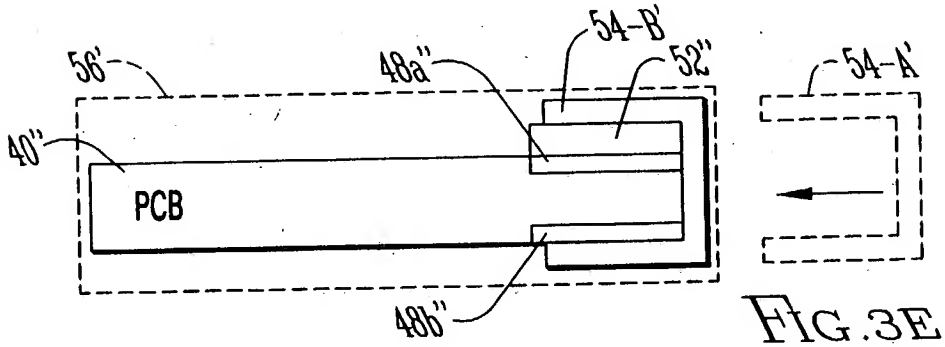

FIG.3E

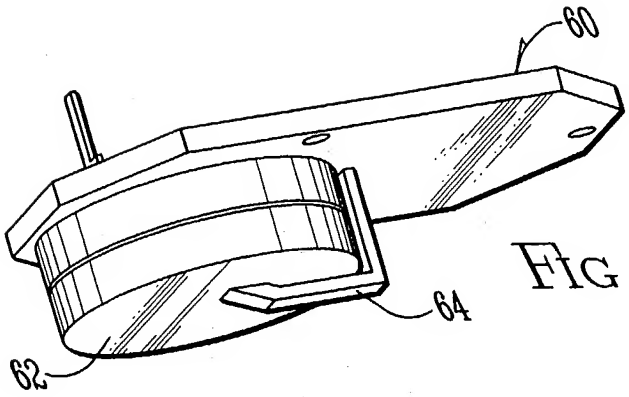

FIG.3F

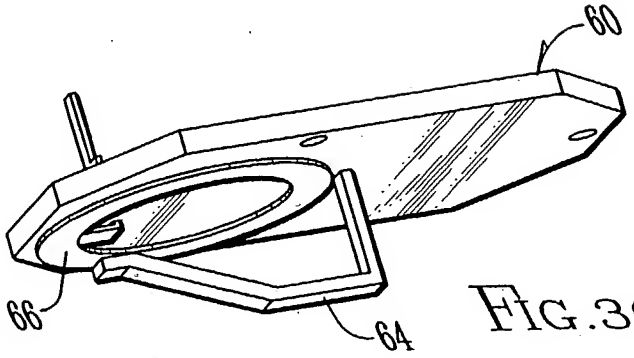

FIG.3G

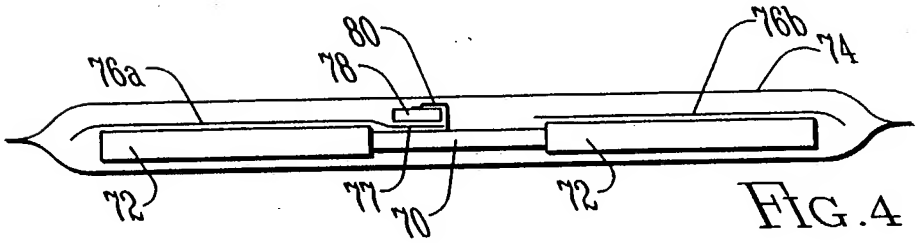

FIG.4

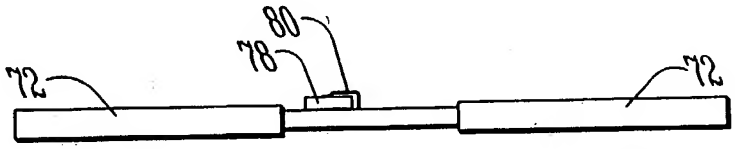

FIG.4A

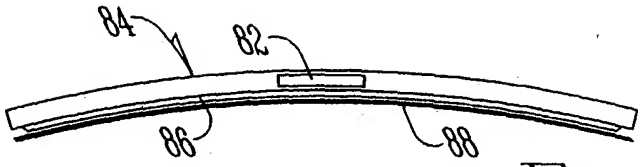

FIG.5

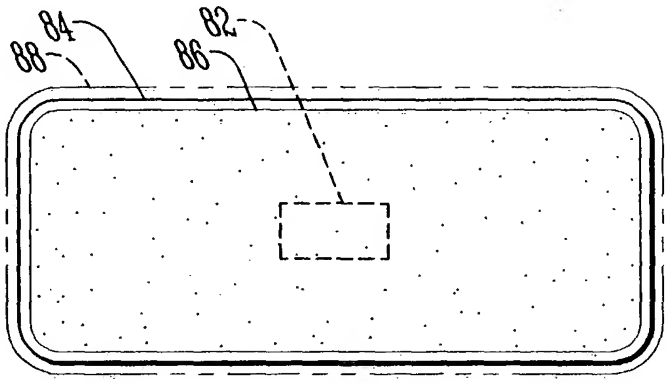

FIG.5A

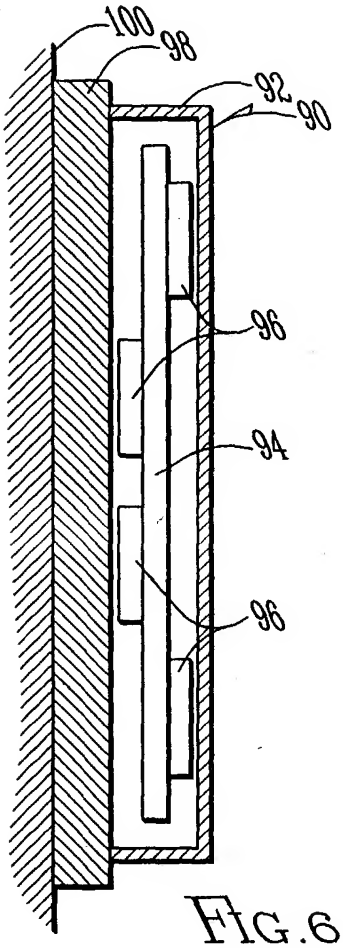

FIG.6

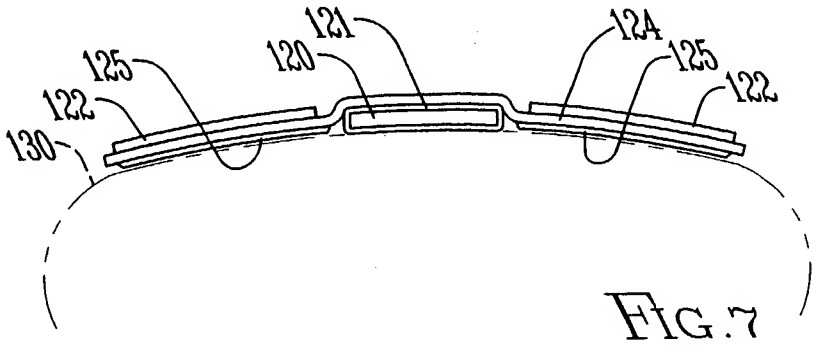

FIG. 7

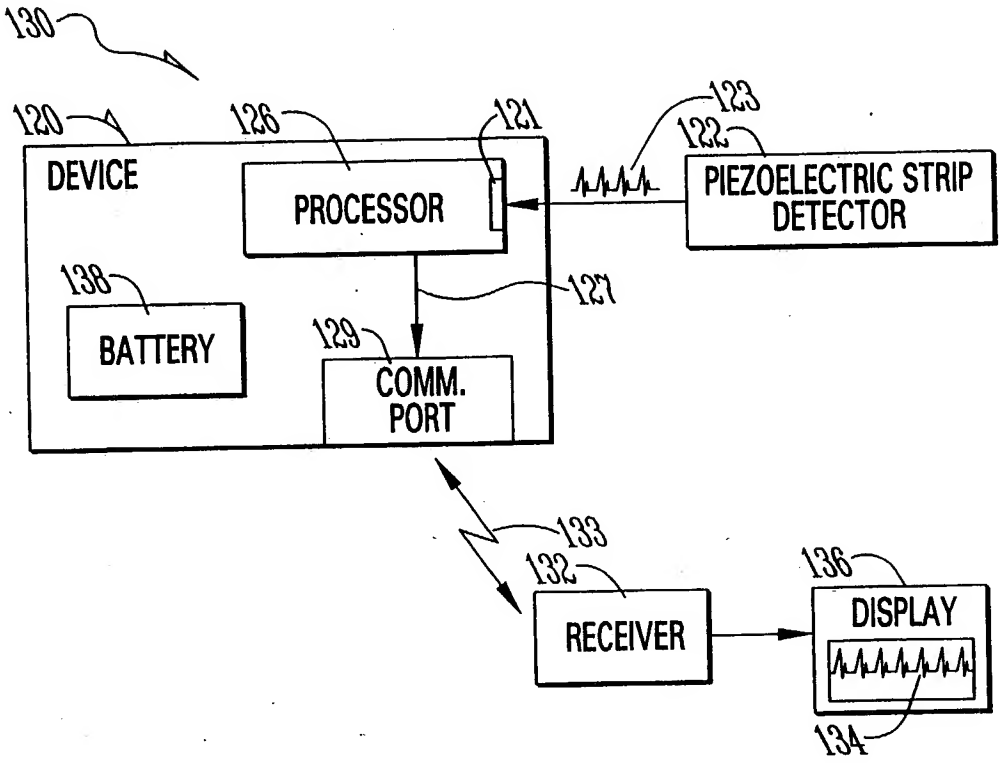

FIG. 7A

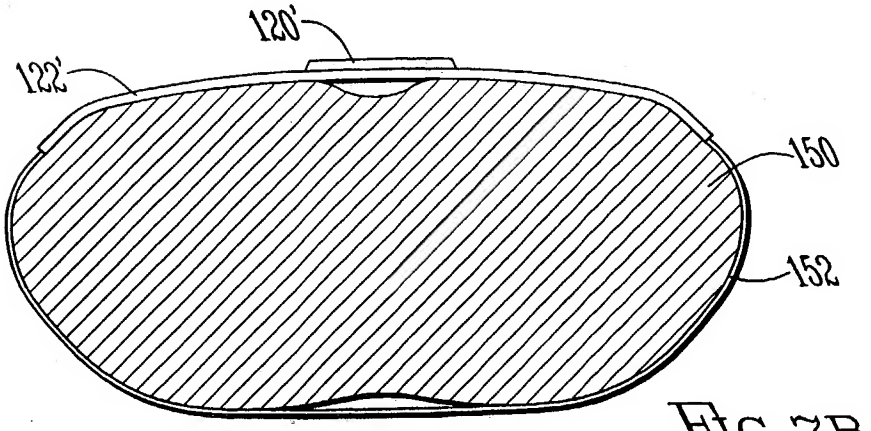

FIG. 7B

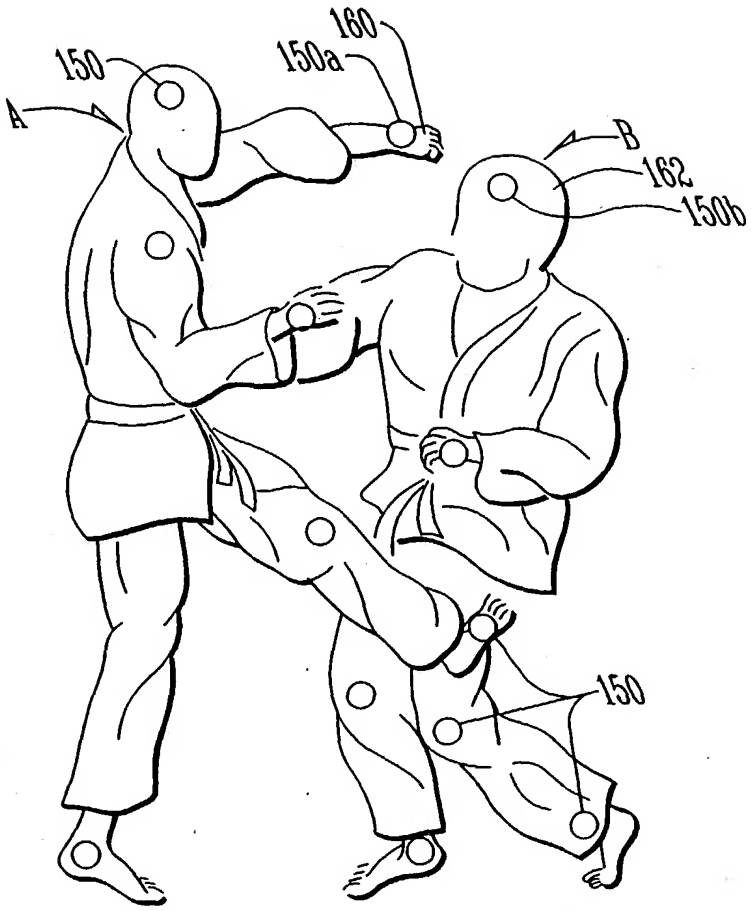
160
150a
150
A
B
162
150b
150

FIG.8

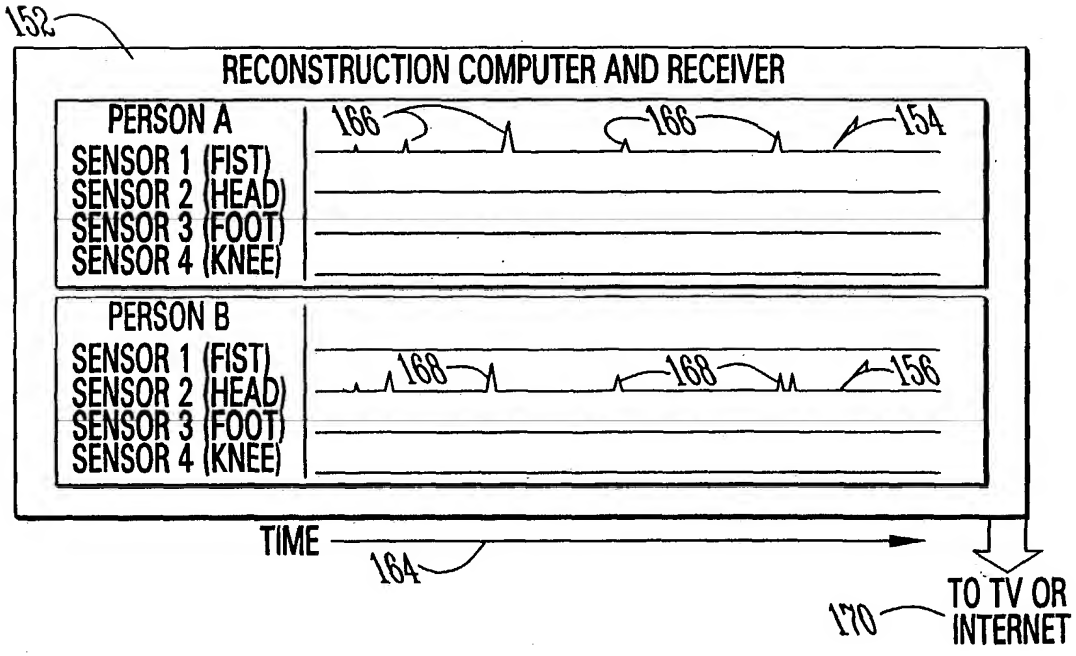
152
RECONSTRUCTION COMPUTER AND RECEIVER
PERSON A
SENSOR 1 (FIST)
SENSOR 2 (HEAD)
SENSOR 3 (FOOT)
SENSOR 4 (KNEE)
166
166
154
PERSON B
SENSOR 1 (FIST)
SENSOR 2 (HEAD)
SENSOR 3 (FOOT)
SENSOR 4 (KNEE)
168
168
156
TIME
164
170
TO TV OR INTERNET

FIG.8A

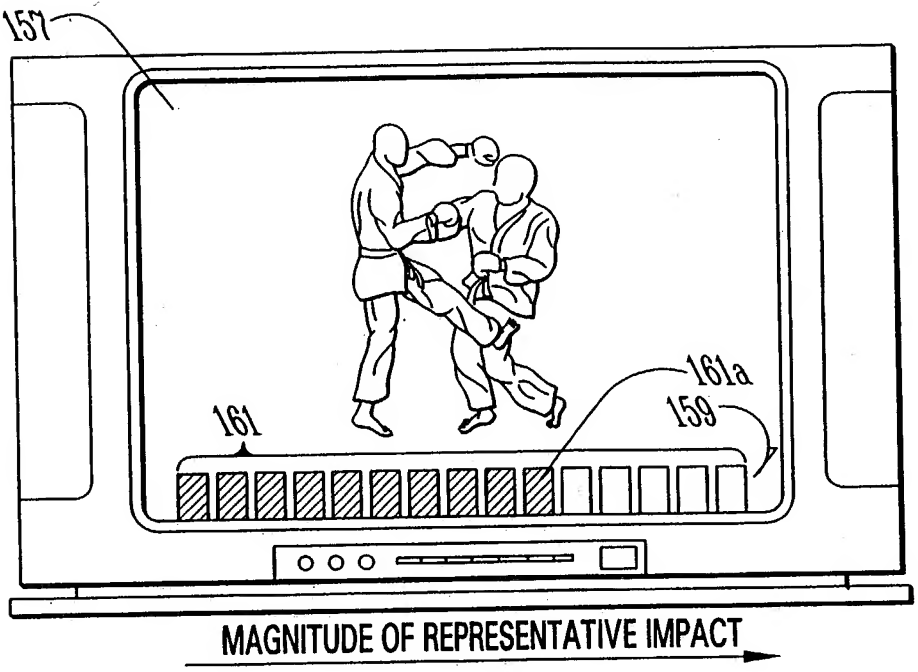
157
161
161a
159
MAGNITUDE OF REPRESENTATIVE IMPACT

FIG.8B

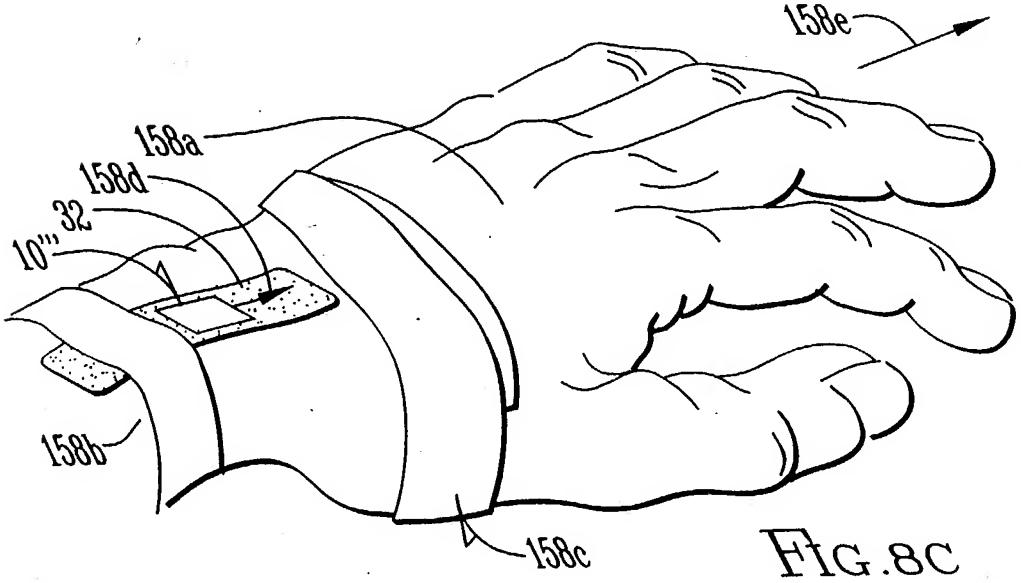
158e
158a
158d
10''' 32
158b
158c

FIG.8C

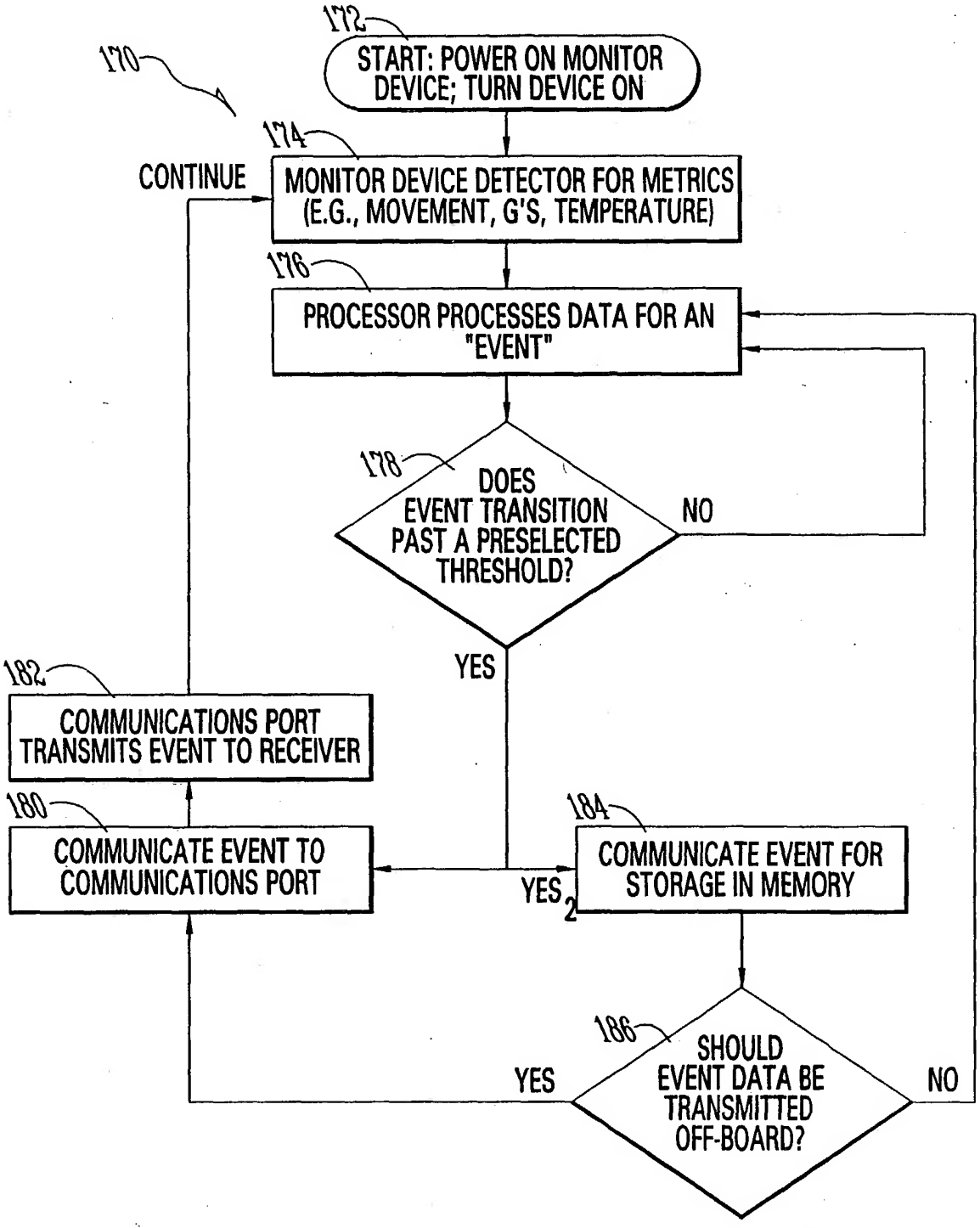
170
172
START: POWER ON MONITOR DEVICE; TURN DEVICE ON
174
CONTINUE
MONITOR DEVICE DETECTOR FOR METRICS (E.G., MOVEMENT, G'S, TEMPERATURE)
176
PROCESSOR PROCESSES DATA FOR AN "EVENT"
178
DOES EVENT TRANSITION PAST A PRESELECTED THRESHOLD?
NO
YES
182
COMMUNICATIONS PORT TRANSMITS EVENT TO RECEIVER
180
COMMUNICATE EVENT TO COMMUNICATIONS PORT
184
COMMUNICATE EVENT FOR STORAGE IN MEMORY
YES
2
186
SHOULD EVENT DATA BE TRANSMITTED OFF-BOARD?
YES
NO

FIG.9

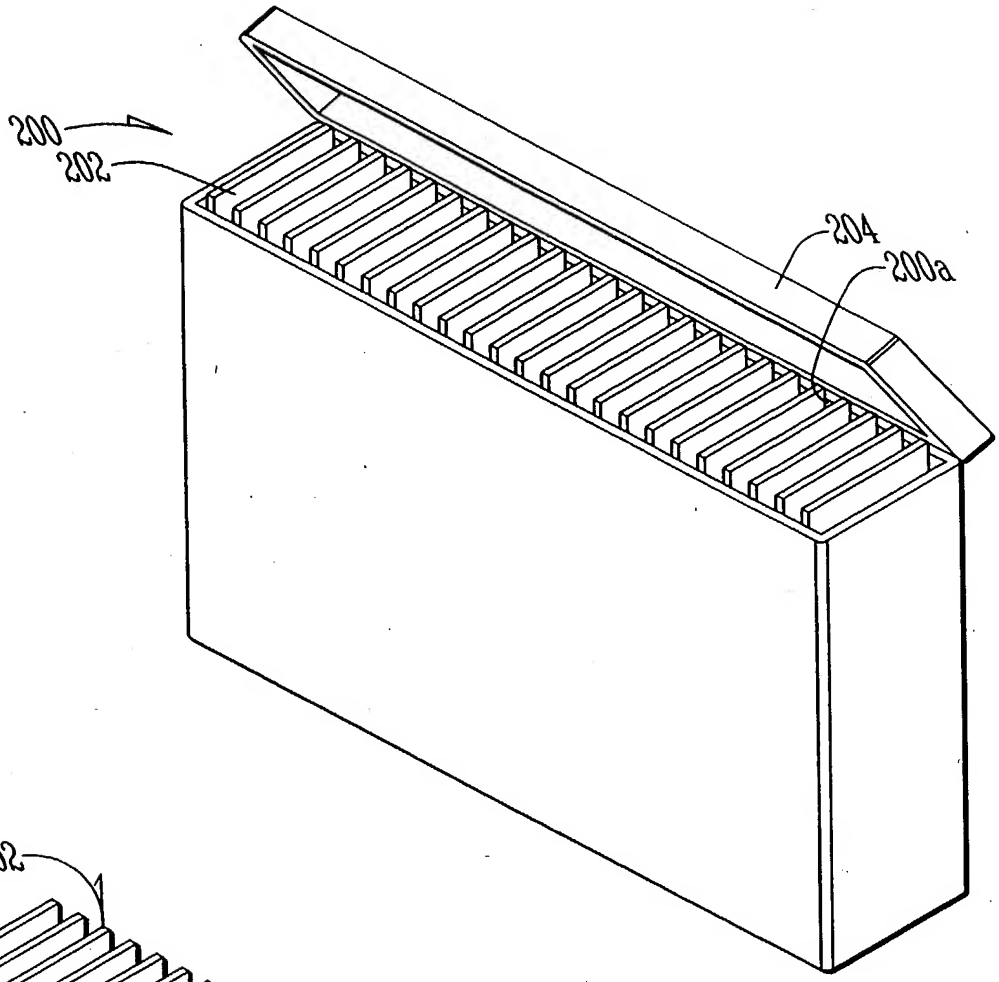

FIG.10

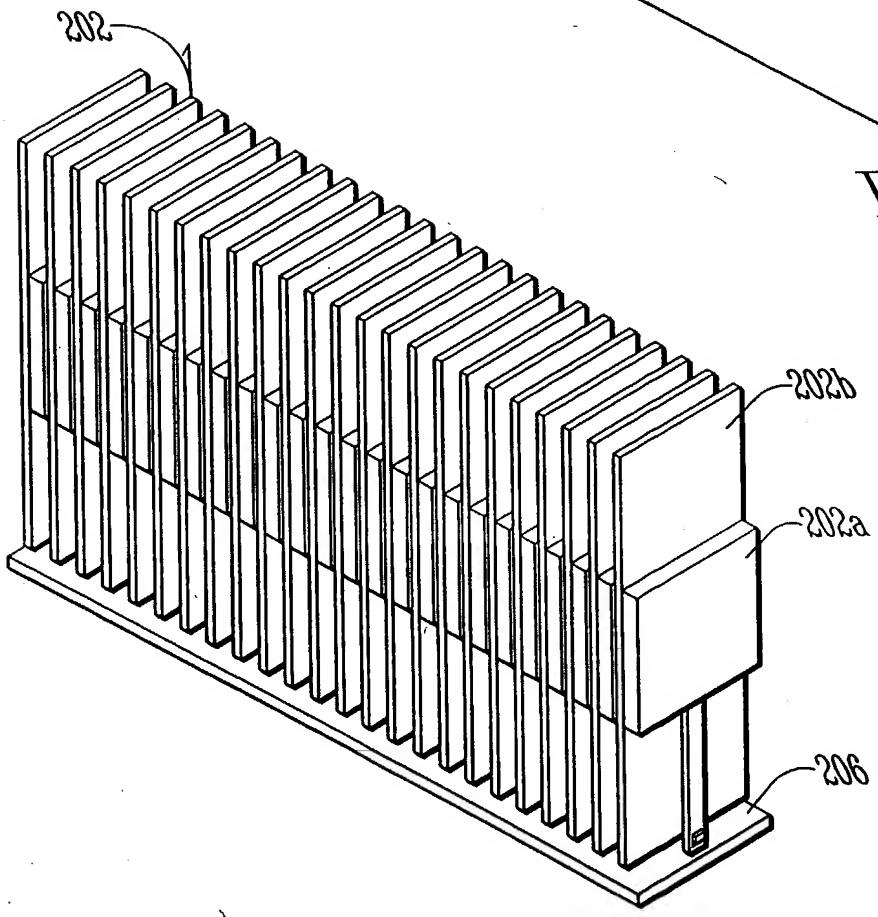

FIG.10A

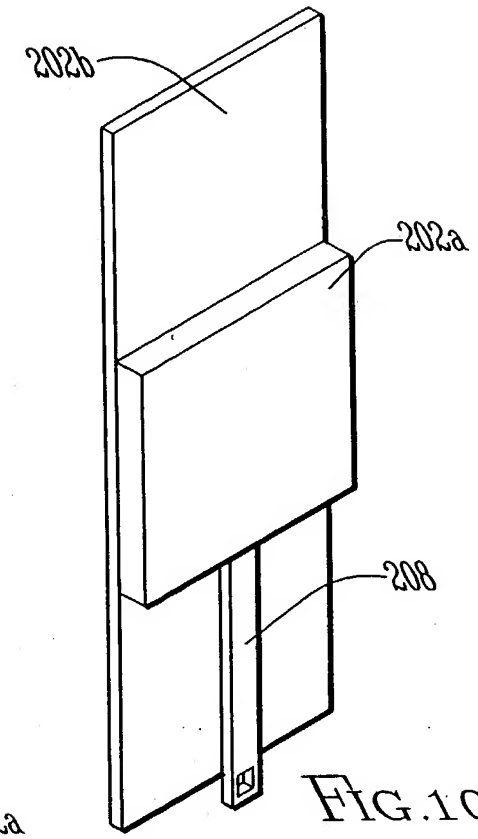

FIG.10B

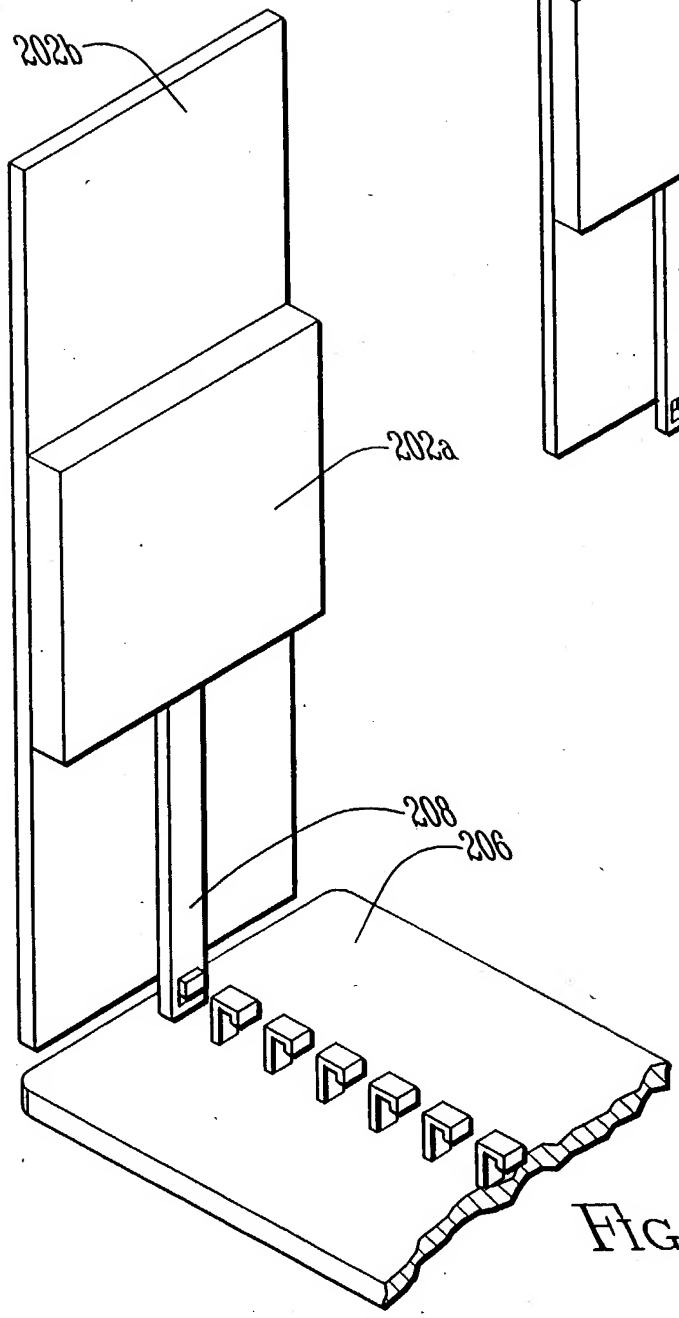

FIG.10C

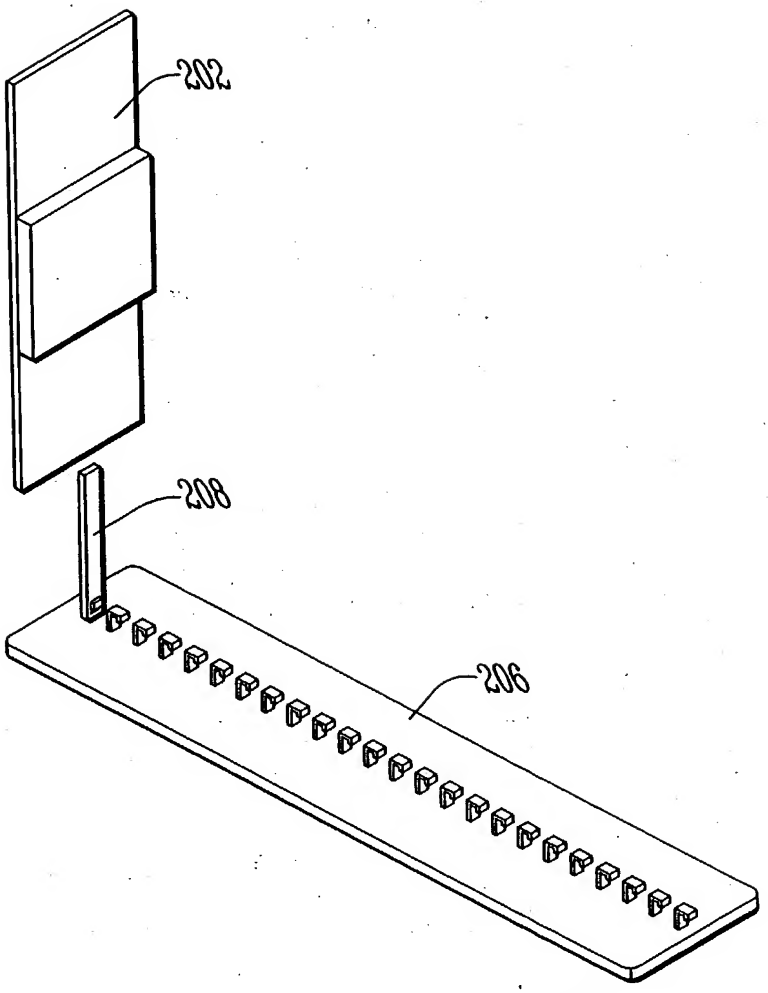

FIG.10D

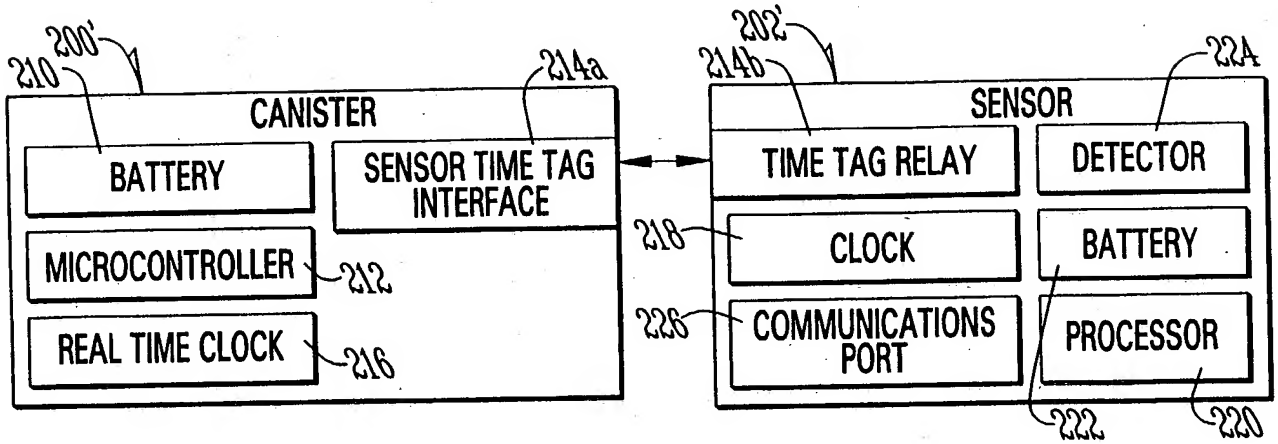

FIG.10E

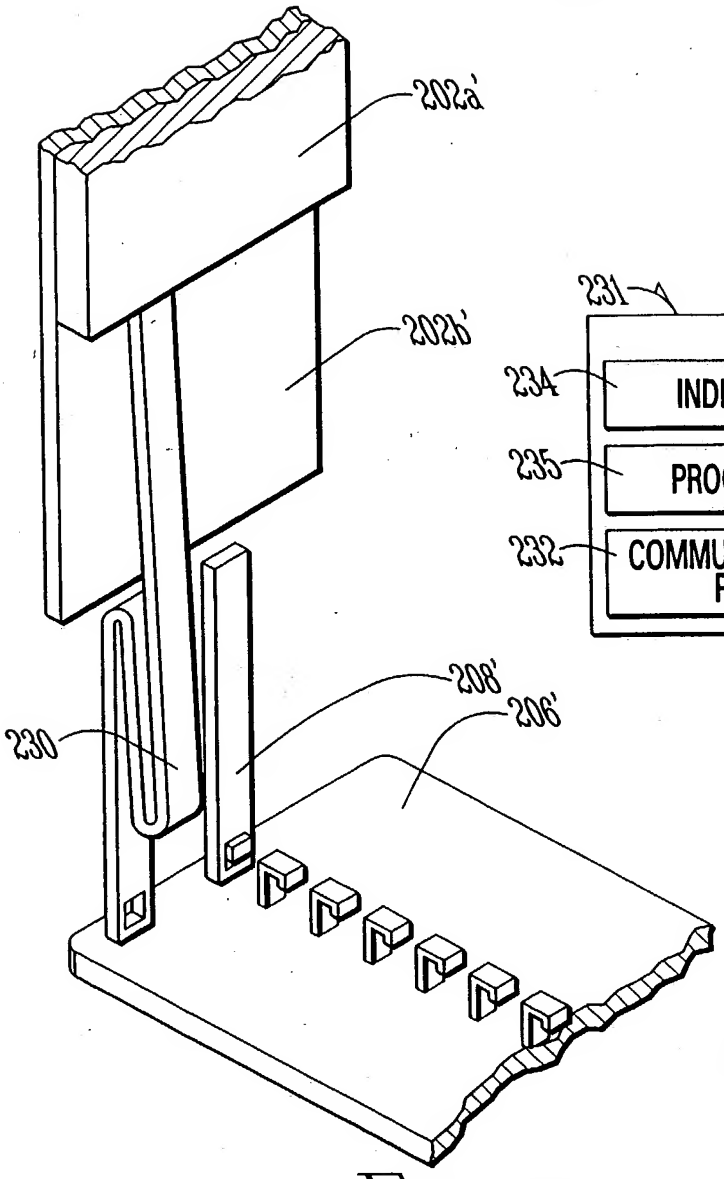

FIG.10F

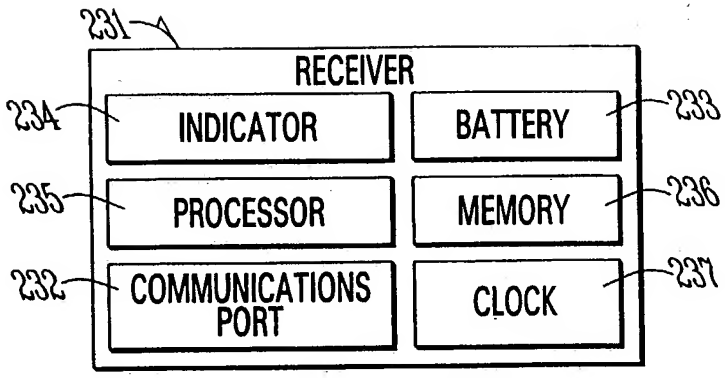

FIG.10G

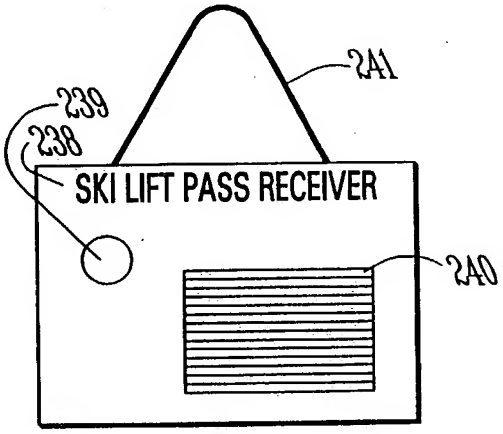

FIG.10H

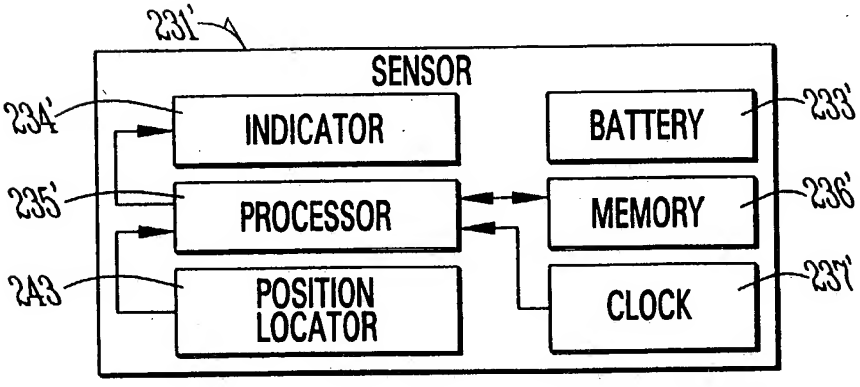

FIG.10I

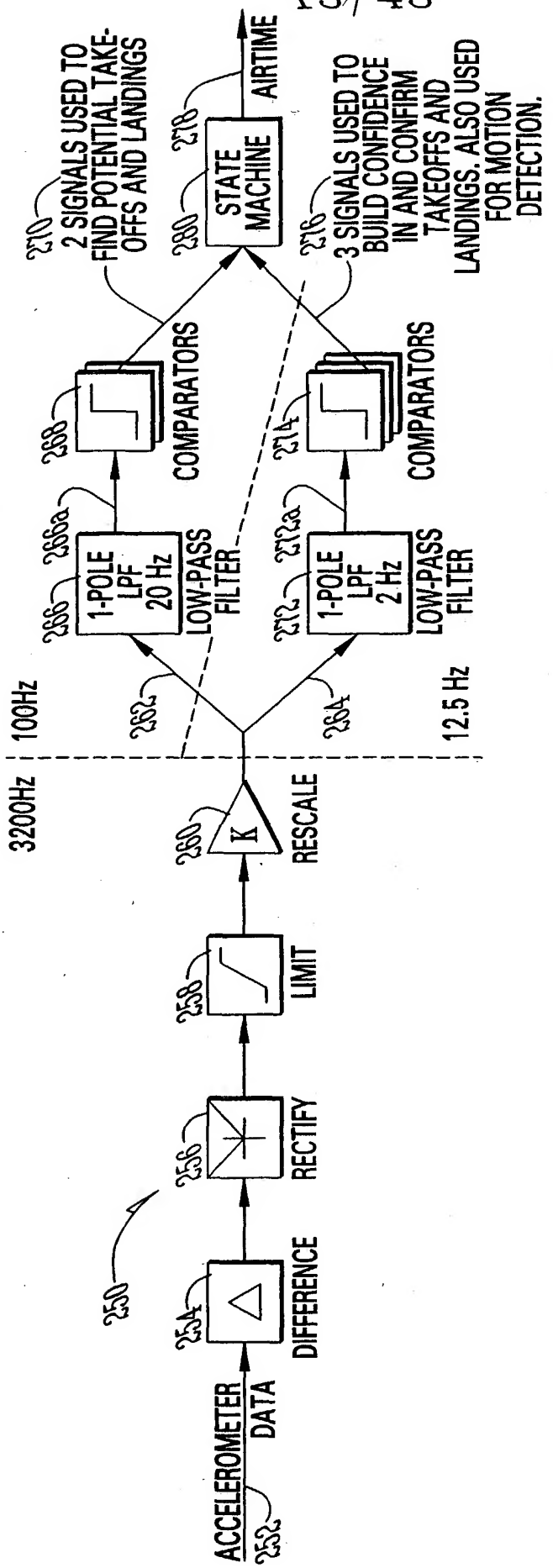
ACCELEROMETER DATA
252
DIFFERENCE
254
250
RECTIFY
256
LIMIT
258
RESCALE
260
K
3200Hz
100Hz
12.5 Hz
262
264
1-POLE LPF 20 Hz
266
266a
LOW-PASS FILTER
1-POLE LPF 2 Hz
272
272a
LOW-PASS FILTER
COMPARATORS
268
COMPARATORS
274
STATE MACHINE
280
AIRTIME
278
2 SIGNALS USED TO FIND POTENTIAL TAKE-OFFS AND LANDINGS
270
3 SIGNALS USED TO BUILD CONFIDENCE IN AND CONFIRM TAKEOFFS AND LANDINGS. ALSO USED FOR MOTION DETECTION.
276

FIG.11

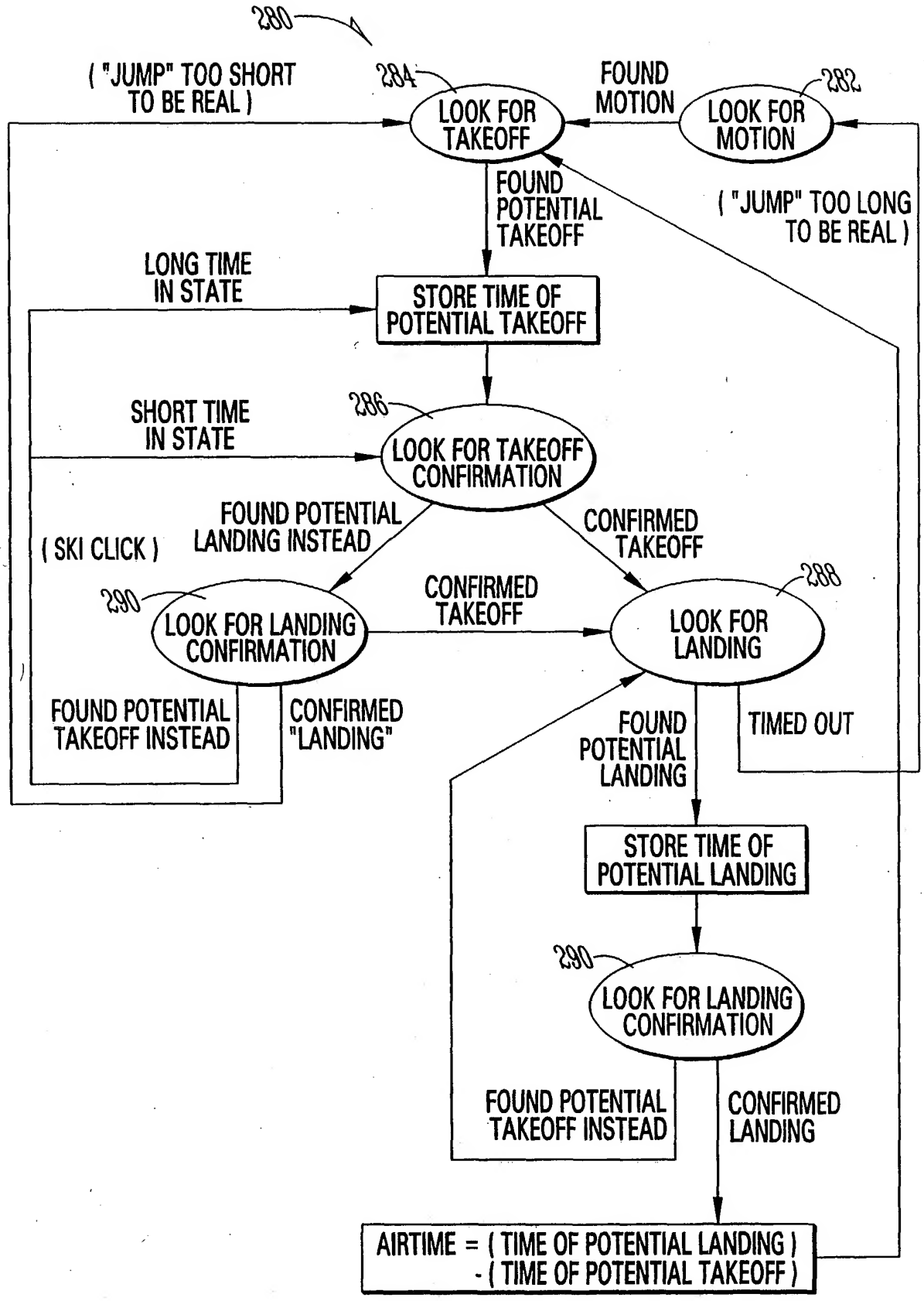
280
("JUMP" TOO SHORT TO BE REAL)
284
LOOK FOR TAKEOFF
FOUND MOTION
282
LOOK FOR MOTION
FOUND POTENTIAL TAKEOFF
("JUMP" TOO LONG TO BE REAL)
LONG TIME IN STATE
STORE TIME OF POTENTIAL TAKEOFF
SHORT TIME IN STATE
286
LOOK FOR TAKEOFF CONFIRMATION
FOUND POTENTIAL LANDING INSTEAD
(SKI CLICK)
CONFIRMED TAKEOFF
290
LOOK FOR LANDING CONFIRMATION
CONFIRMED TAKEOFF
288
LOOK FOR LANDING
FOUND POTENTIAL TAKEOFF INSTEAD
CONFIRMED "LANDING"
FOUND POTENTIAL LANDING
TIMED OUT
STORE TIME OF POTENTIAL LANDING
290
LOOK FOR LANDING CONFIRMATION
FOUND POTENTIAL TAKEOFF INSTEAD
CONFIRMED LANDING
AIRTIME = (TIME OF POTENTIAL LANDING) - (TIME OF POTENTIAL TAKEOFF)

FIG.12

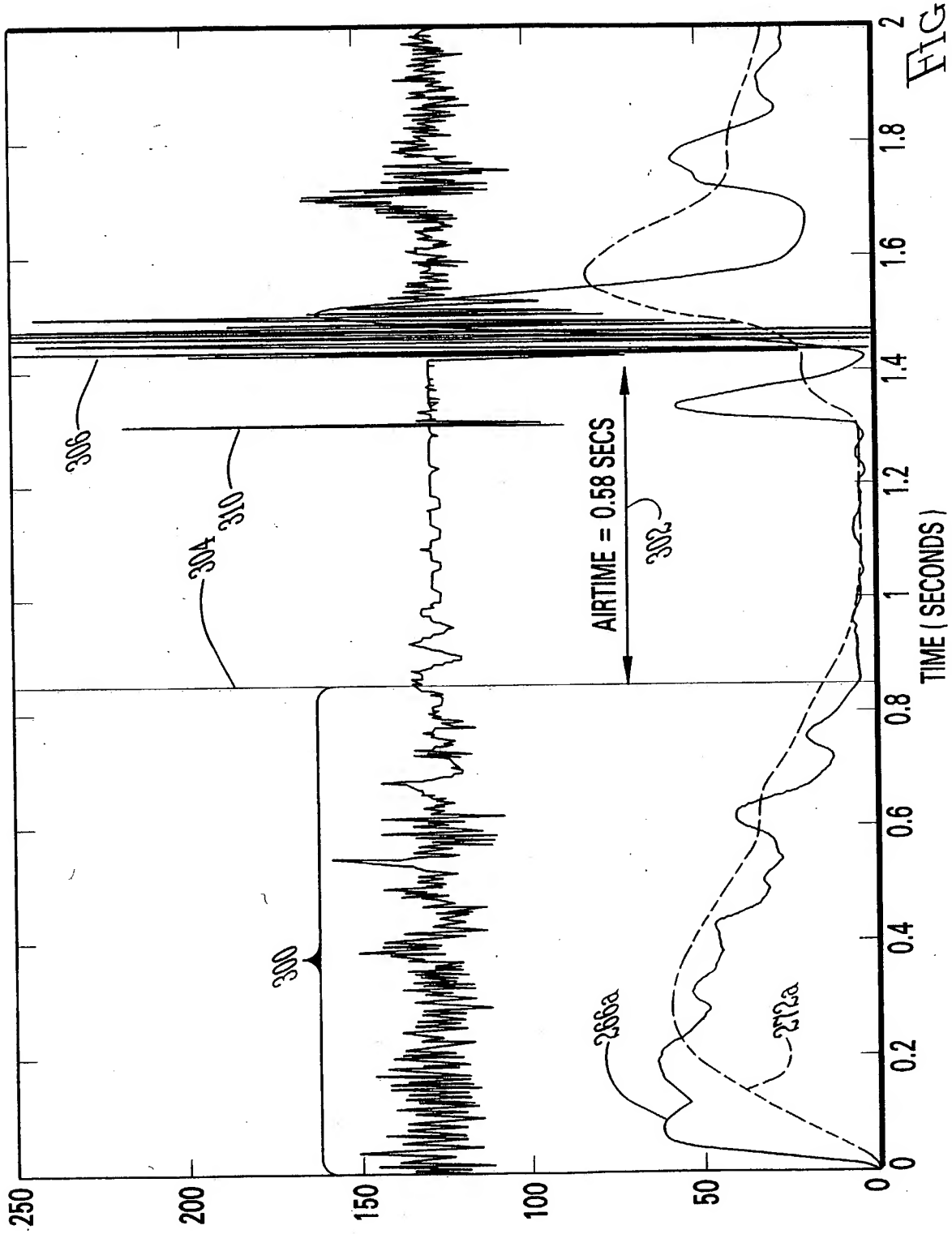
250
200
150
100
50
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
TIME (SECONDS)
AIRTIME = 0.58 SECS
300
302
304
306
310
266a
272a

FIG.13

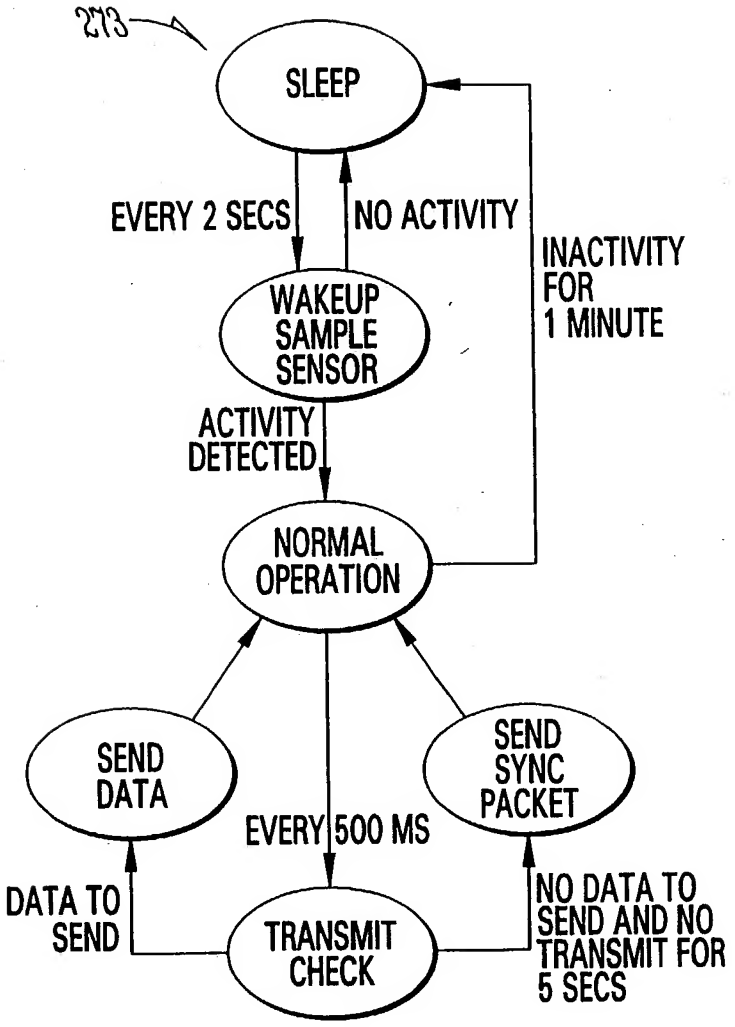
273
SLEEP
EVERY 2 SECS
NO ACTIVITY
INACTIVITY FOR 1 MINUTE
WAKEUP SAMPLE SENSOR
ACTIVITY DETECTED
NORMAL OPERATION
SEND DATA
SEND SYNC PACKET
EVERY 500 MS
DATA TO SEND
TRANSMIT CHECK
NO DATA TO SEND AND NO TRANSMIT FOR 5 SECS

FIG.14

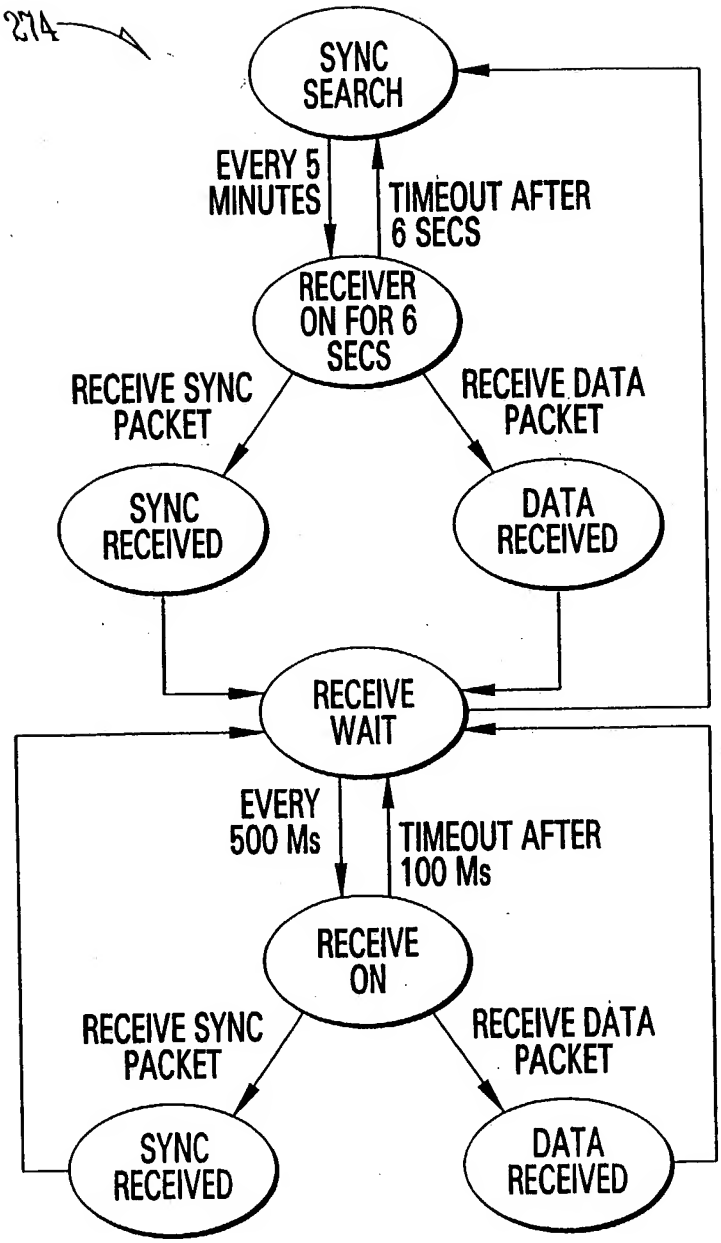
274
SYNC SEARCH
EVERY 5 MINUTES
TIMEOUT AFTER 6 SECS
RECEIVER ON FOR 6 SECS
RECEIVE SYNC PACKET
RECEIVE DATA PACKET
SYNC RECEIVED
DATA RECEIVED
RECEIVE WAIT
EVERY 500 Ms
TIMEOUT AFTER 100 Ms
RECEIVE ON
RECEIVE SYNC PACKET
RECEIVE DATA PACKET
SYNC RECEIVED
DATA RECEIVED

FIG.14A

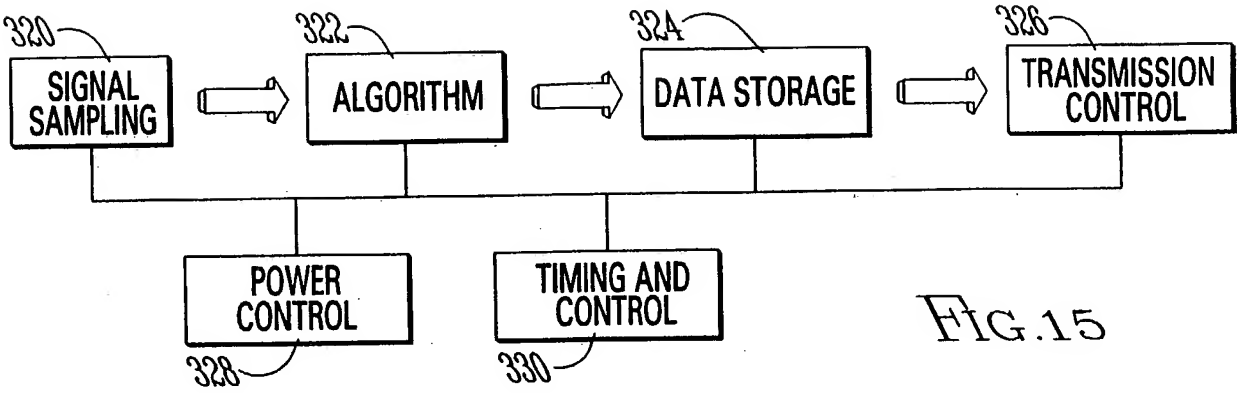
320
SIGNAL SAMPLING
322
ALGORITHM
324
DATA STORAGE
326
TRANSMISSION CONTROL
POWER CONTROL
328
TIMING AND CONTROL
330

FIG.15

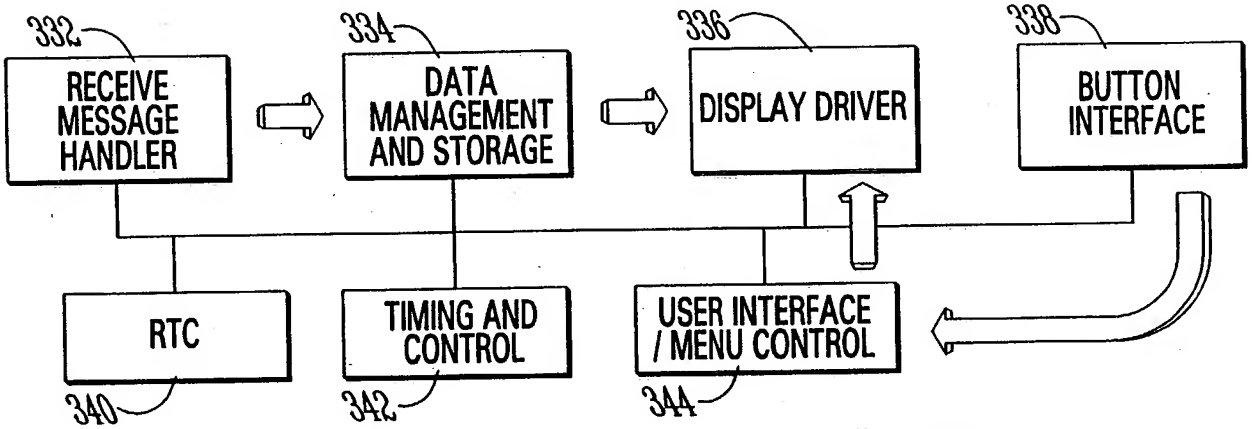
332
RECEIVE MESSAGE HANDLER
334
DATA MANAGEMENT AND STORAGE
336
DISPLAY DRIVER
338
BUTTON INTERFACE
RTC
340
TIMING AND CONTROL
342
USER INTERFACE / MENU CONTROL
344

FIG.16

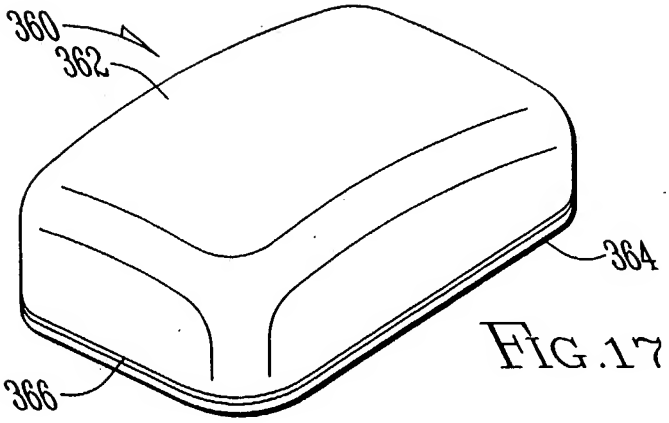

FIG.17

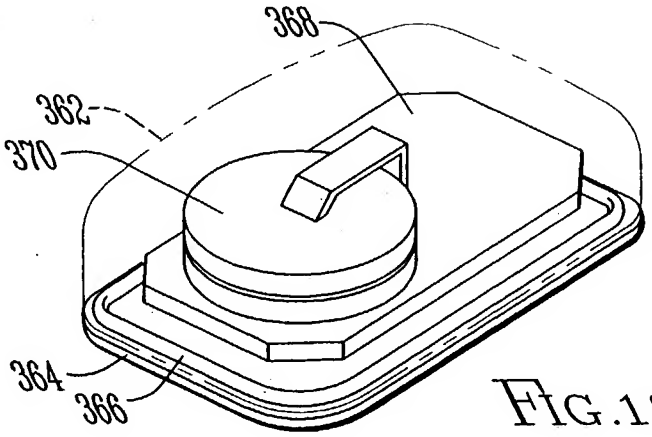

FIG.18

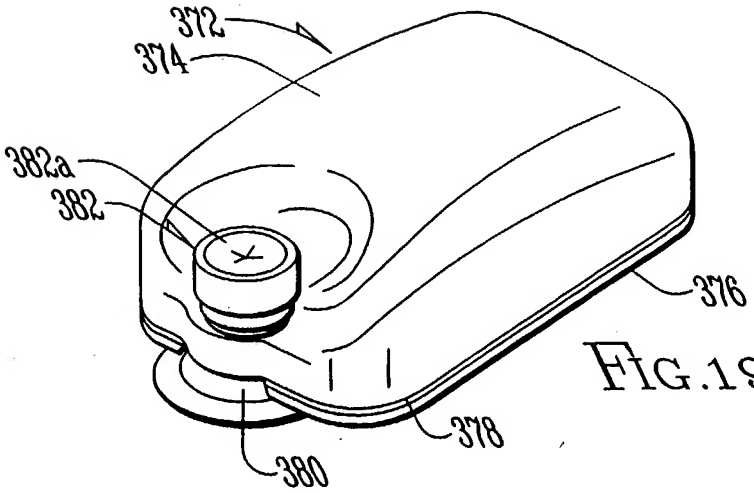

FIG.19

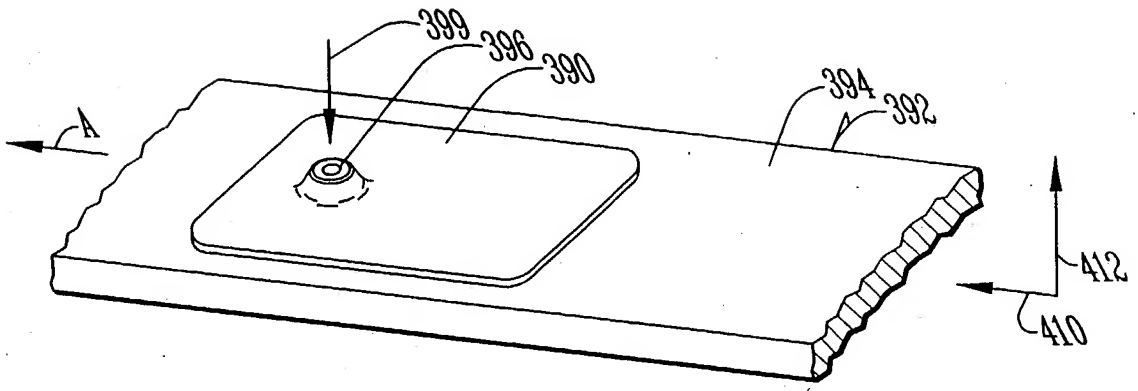

FIG.20

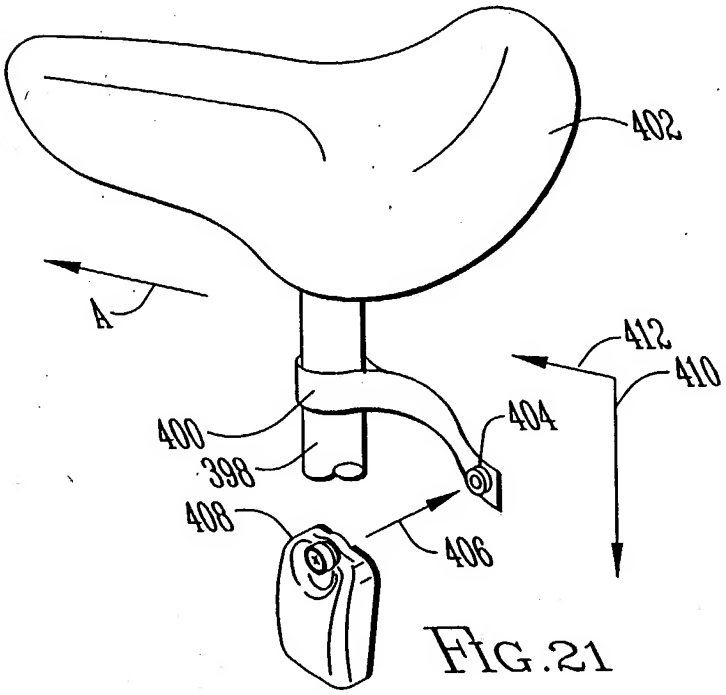

FIG.21

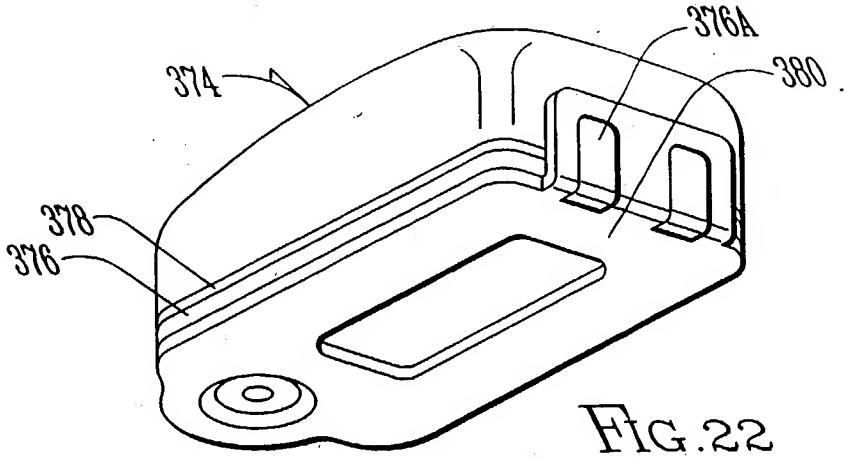

FIG.22

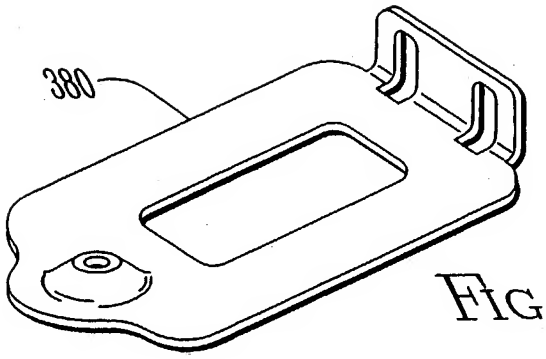

FIG.23

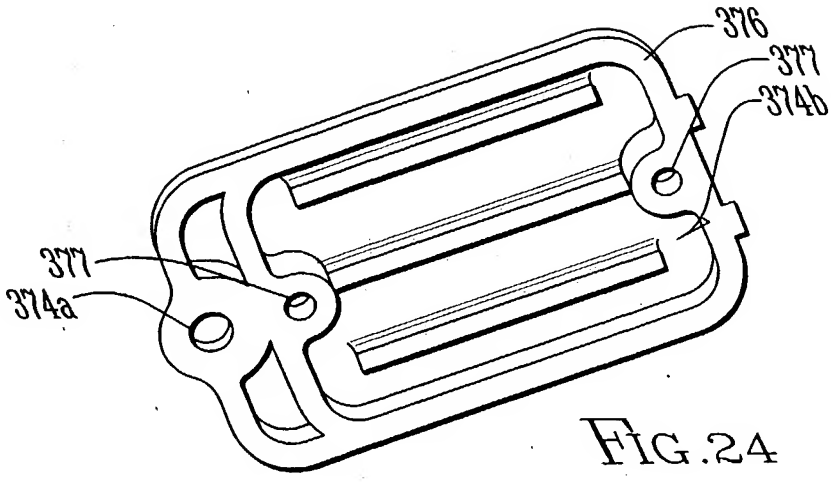

FIG.24

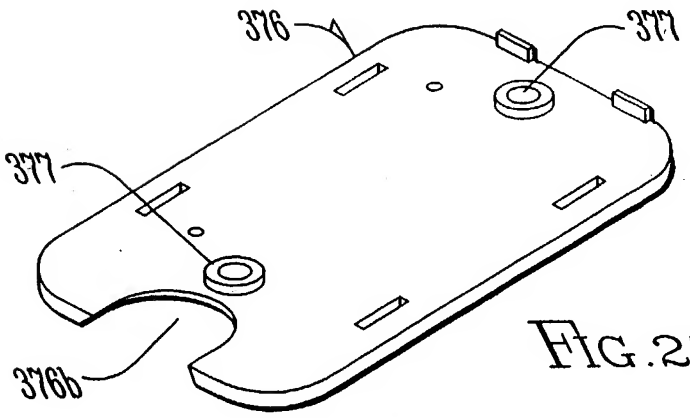

FIG.25

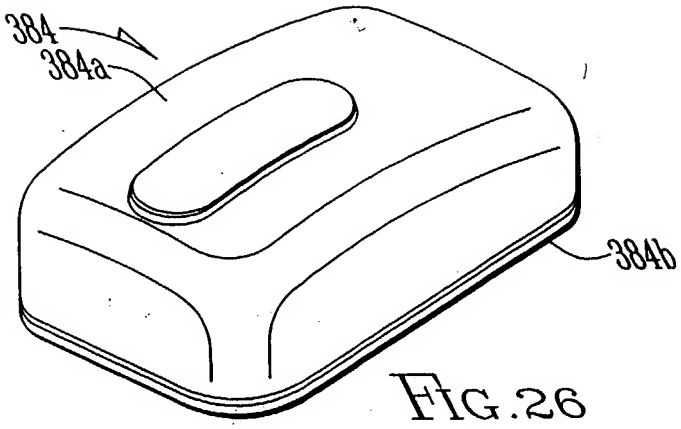

FIG.26

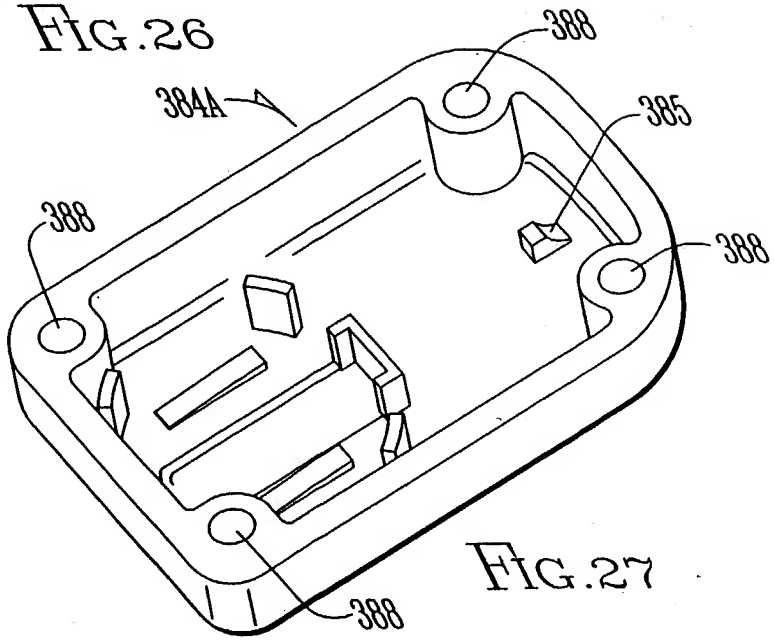

FIG.27

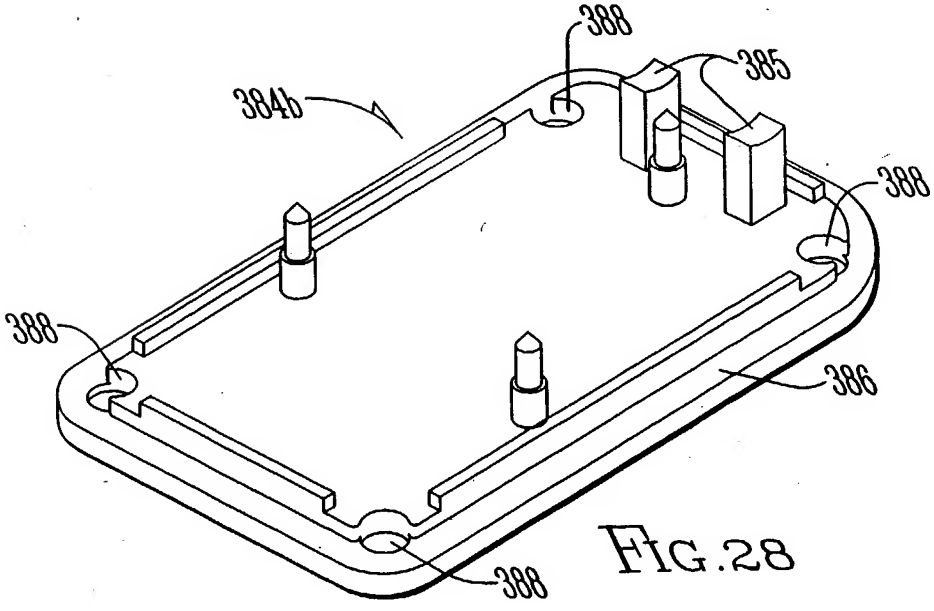

FIG.28

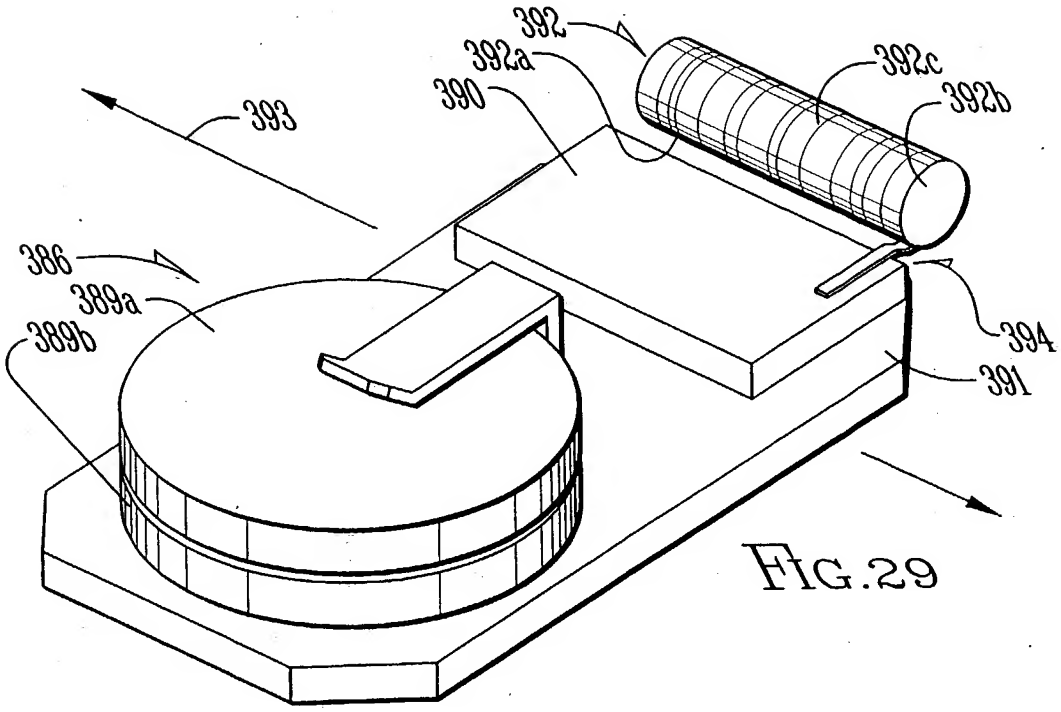

FIG.29

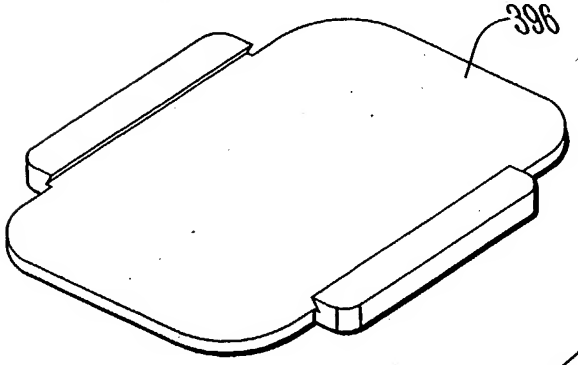

FIG.30

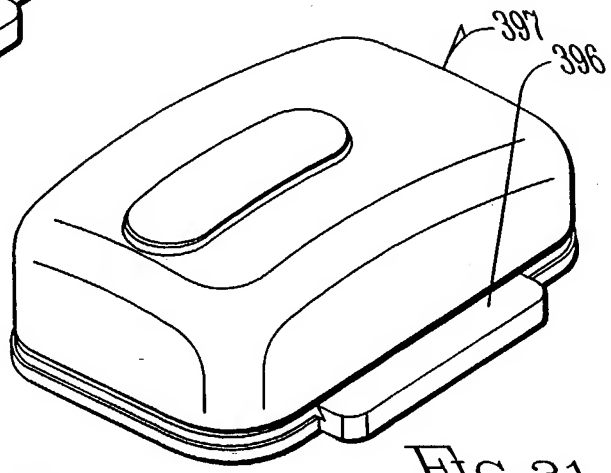

FIG.31

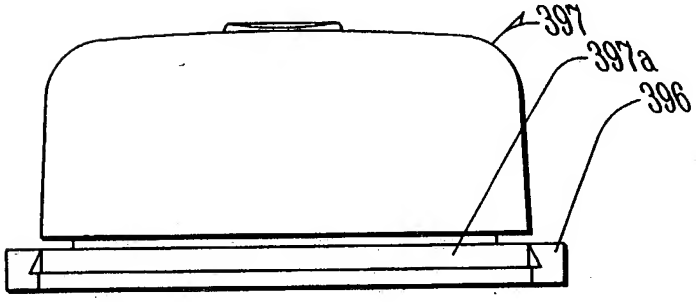

FIG.32

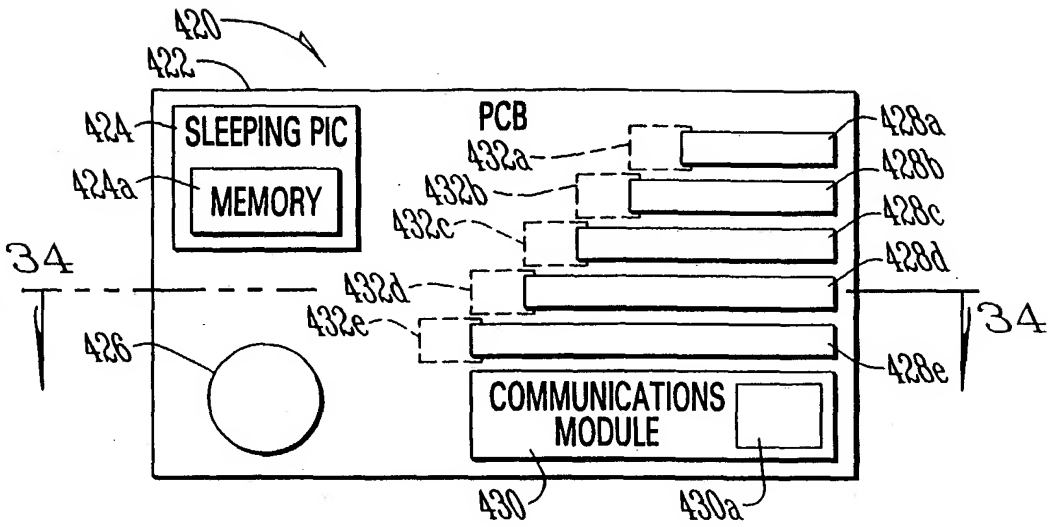

FIG.33

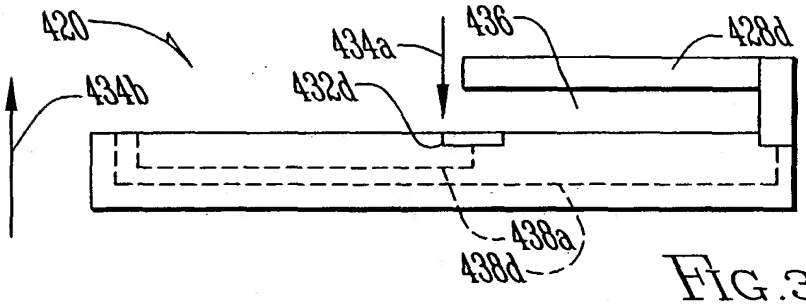

FIG.34

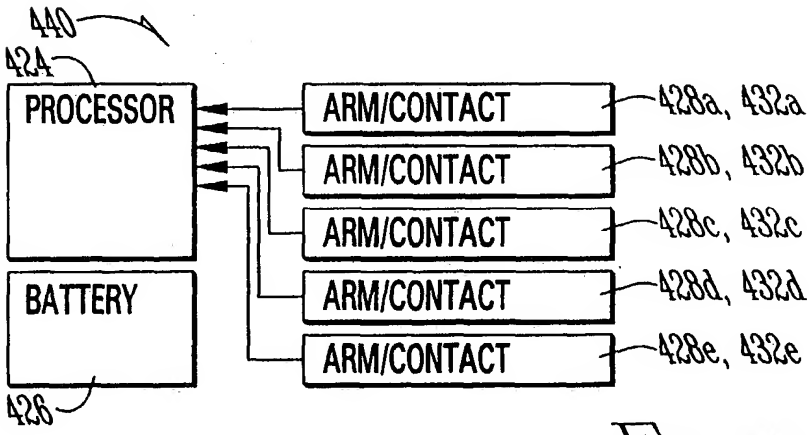

FIG.35

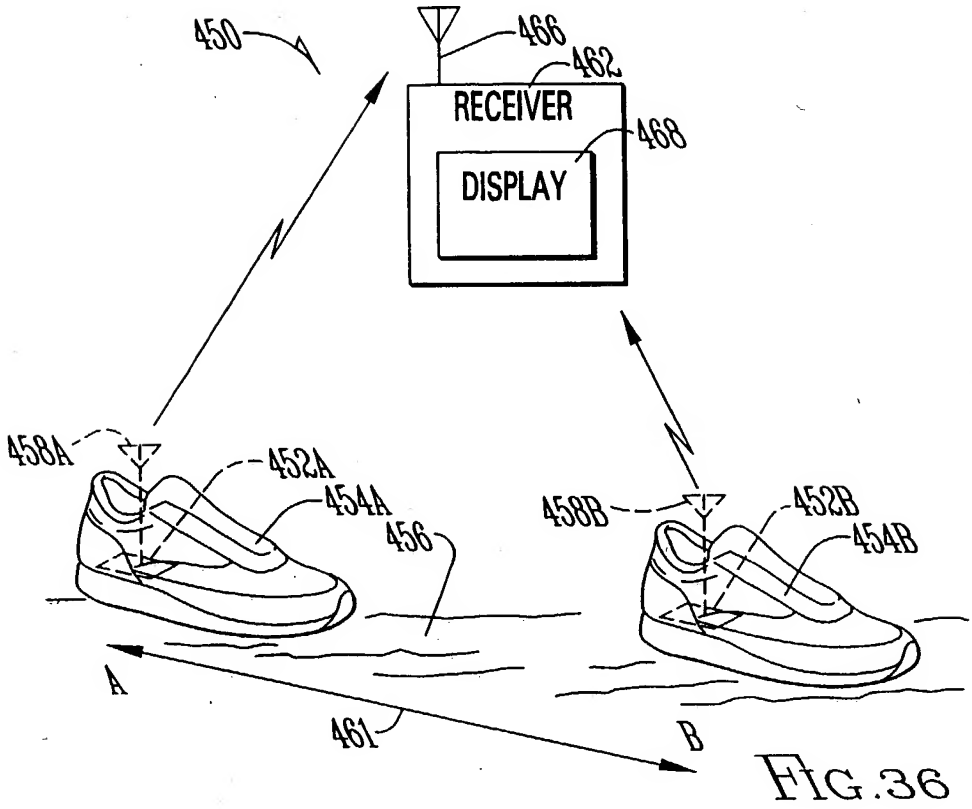
450
466
462
RECEIVER
468
DISPLAY
458A
452A
454A
456
458B
452B
454B
A
461
B

FIG.36

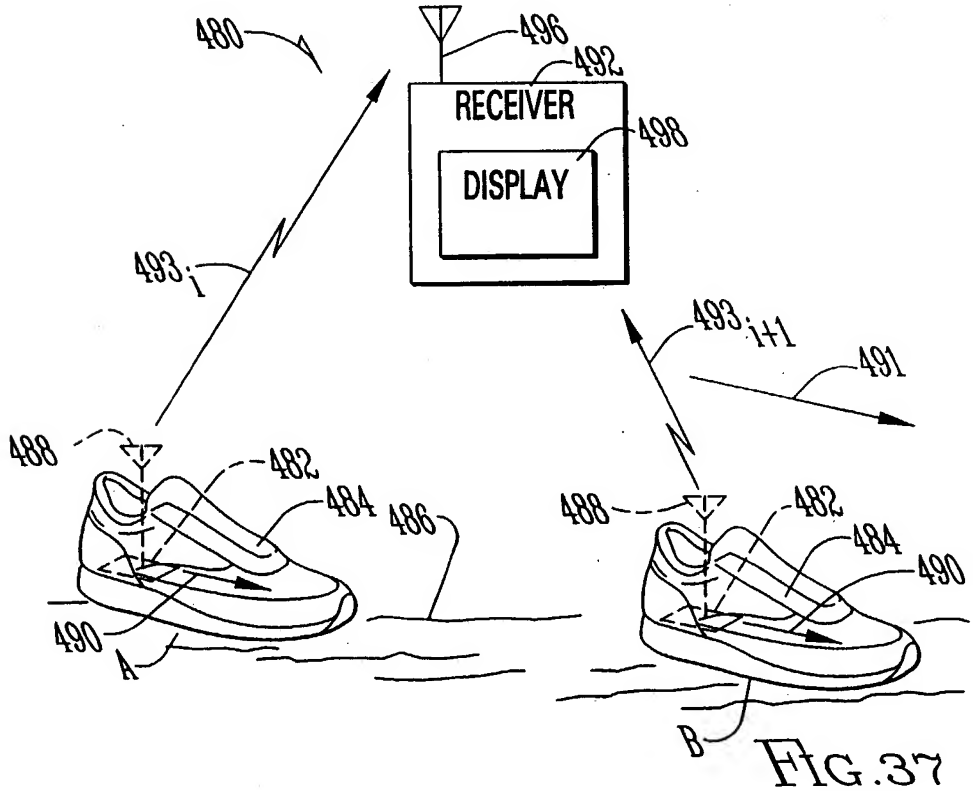
480
496
492
RECEIVER
498
DISPLAY
493;i
493;i+1
491
488
482
484
486
490
A
488
482
484
490
B

FIG.37

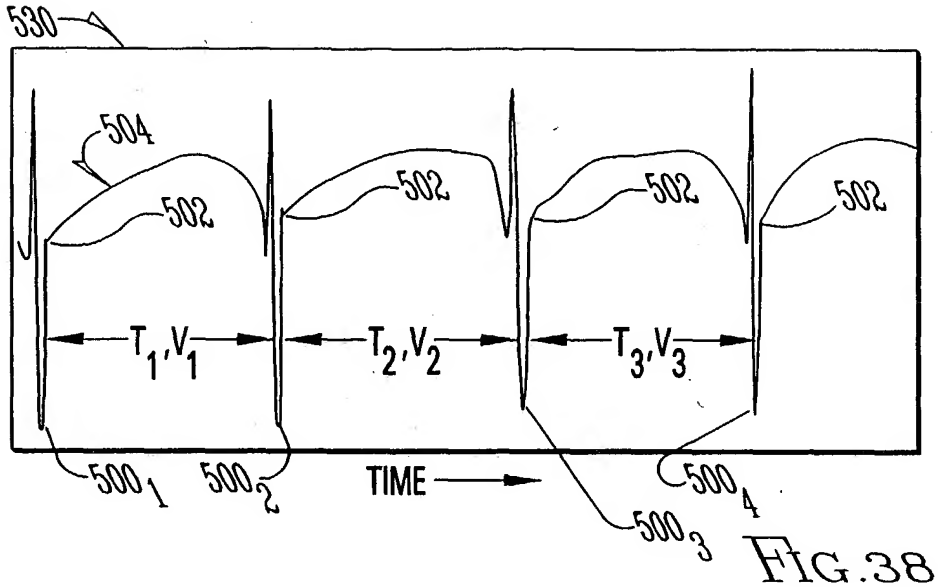
530
504
502
502
502
502
T_1, V_1
T_2, V_2
T_3, V_3
500_1
500_2
TIME
500_3
500_4

FIG.38

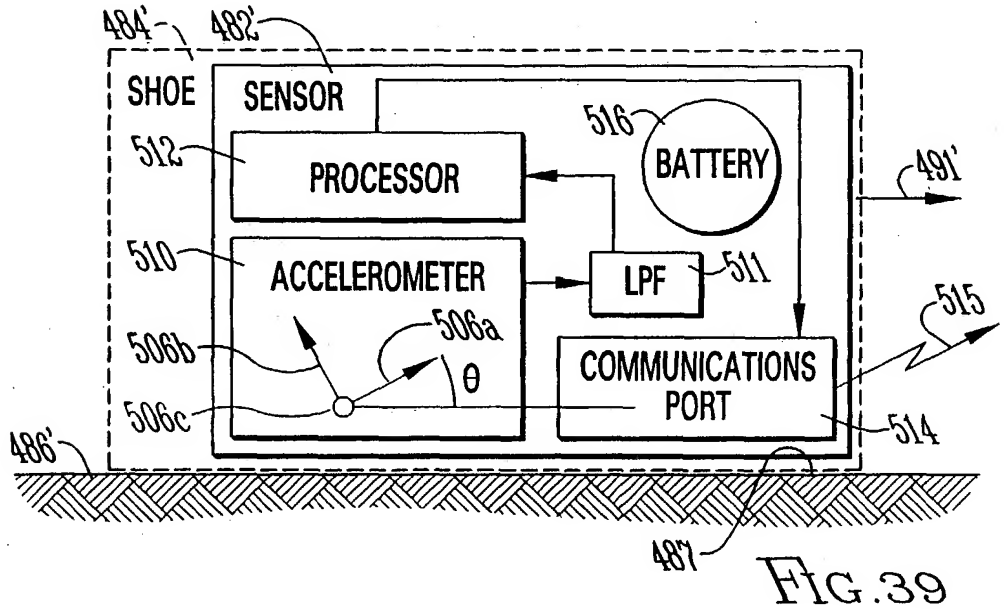
484'
482'
SHOE
SENSOR
516
512
PROCESSOR
BATTERY
491'
510
ACCELEROMETER
LPF
511
515
506a
506b
θ
506c
COMMUNICATIONS PORT
514
486'
487

FIG.39

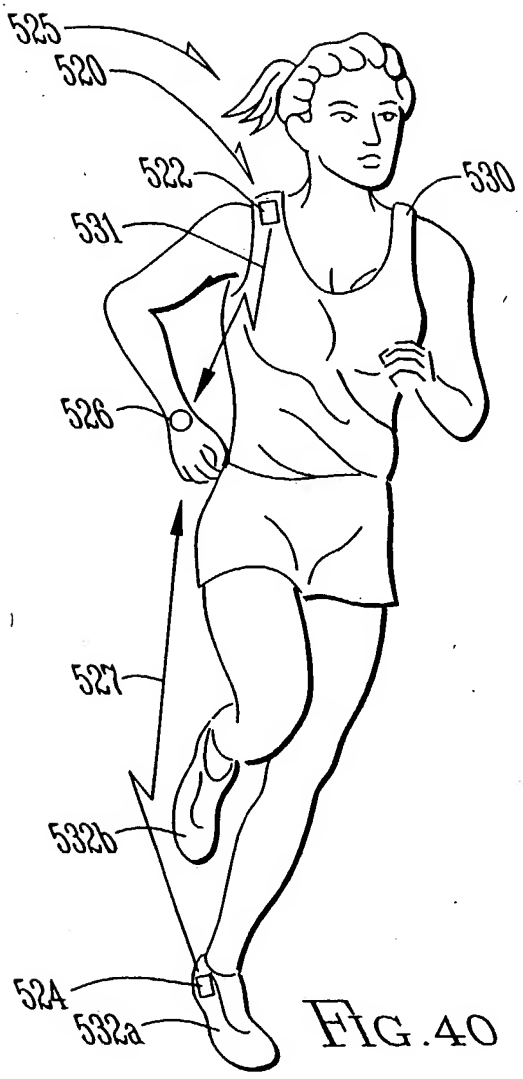
525
520
522
530
531
526
527
532b
524
532a

FIG.40

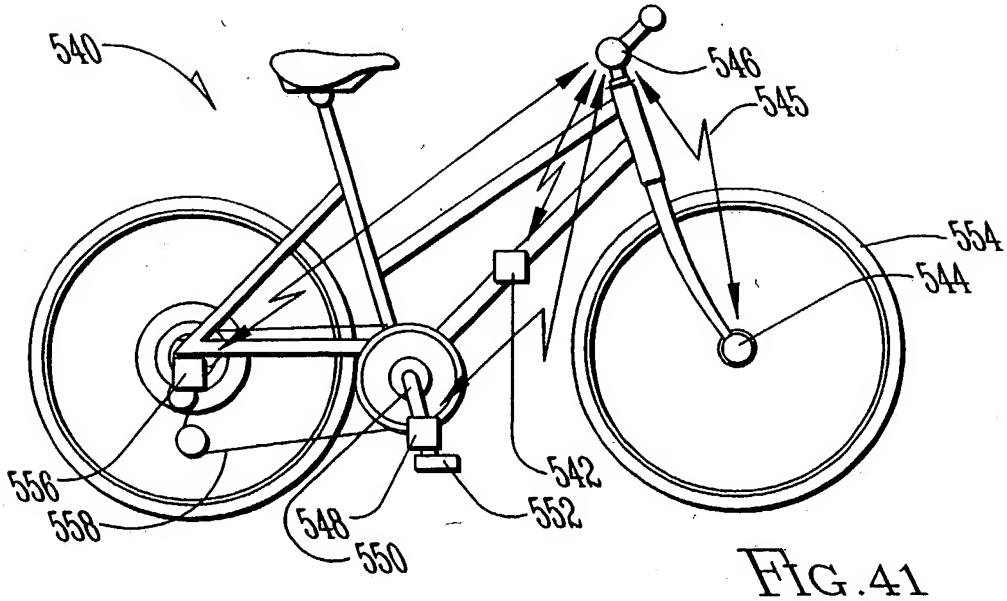
540
546
545
554
544
556
558
548
550
542
552

FIG.41

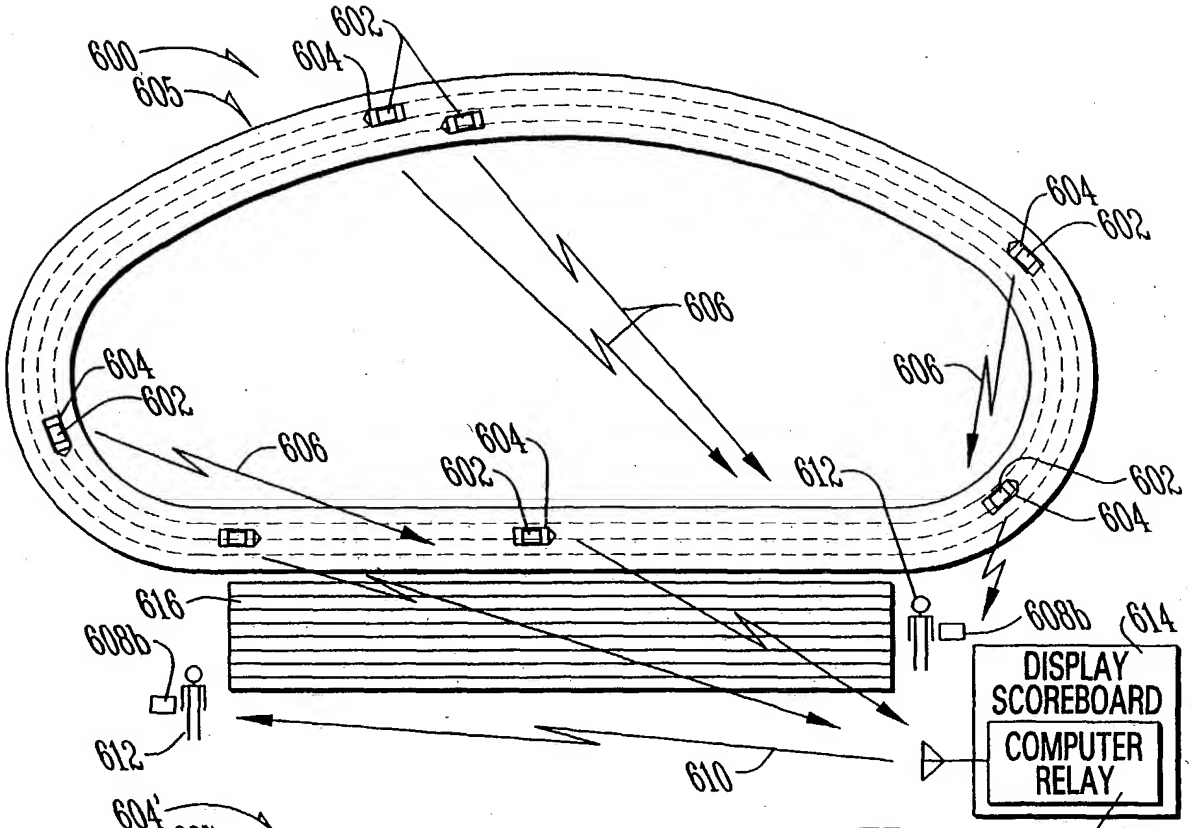

FIG.42

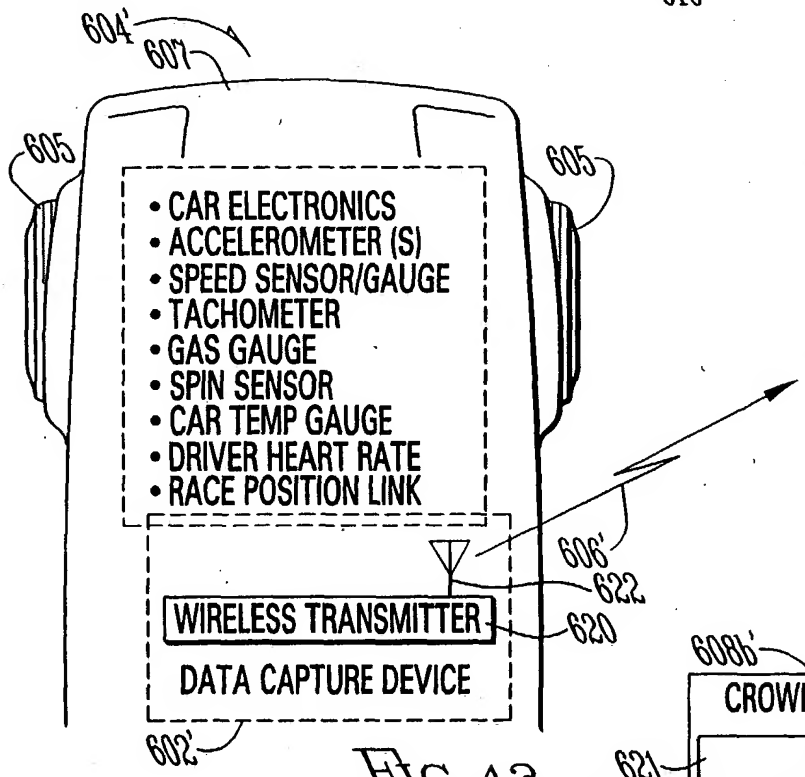

FIG.43

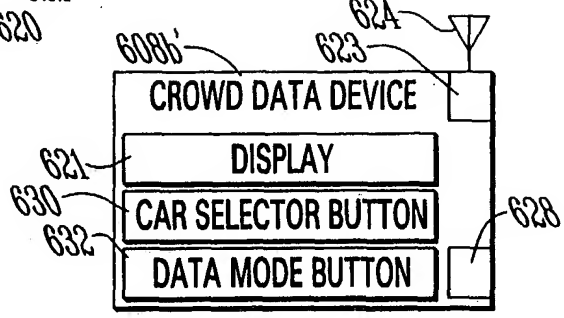

FIG.44

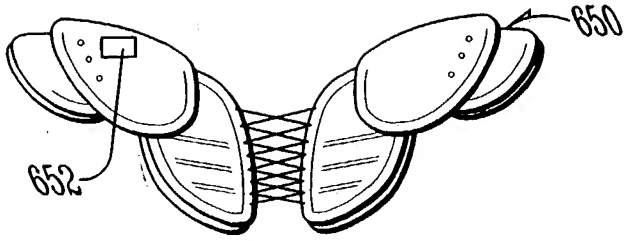

FIG.45

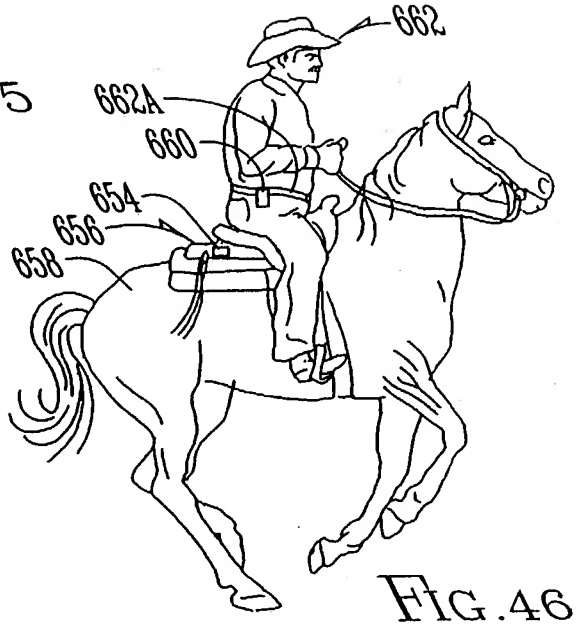

FIG.46

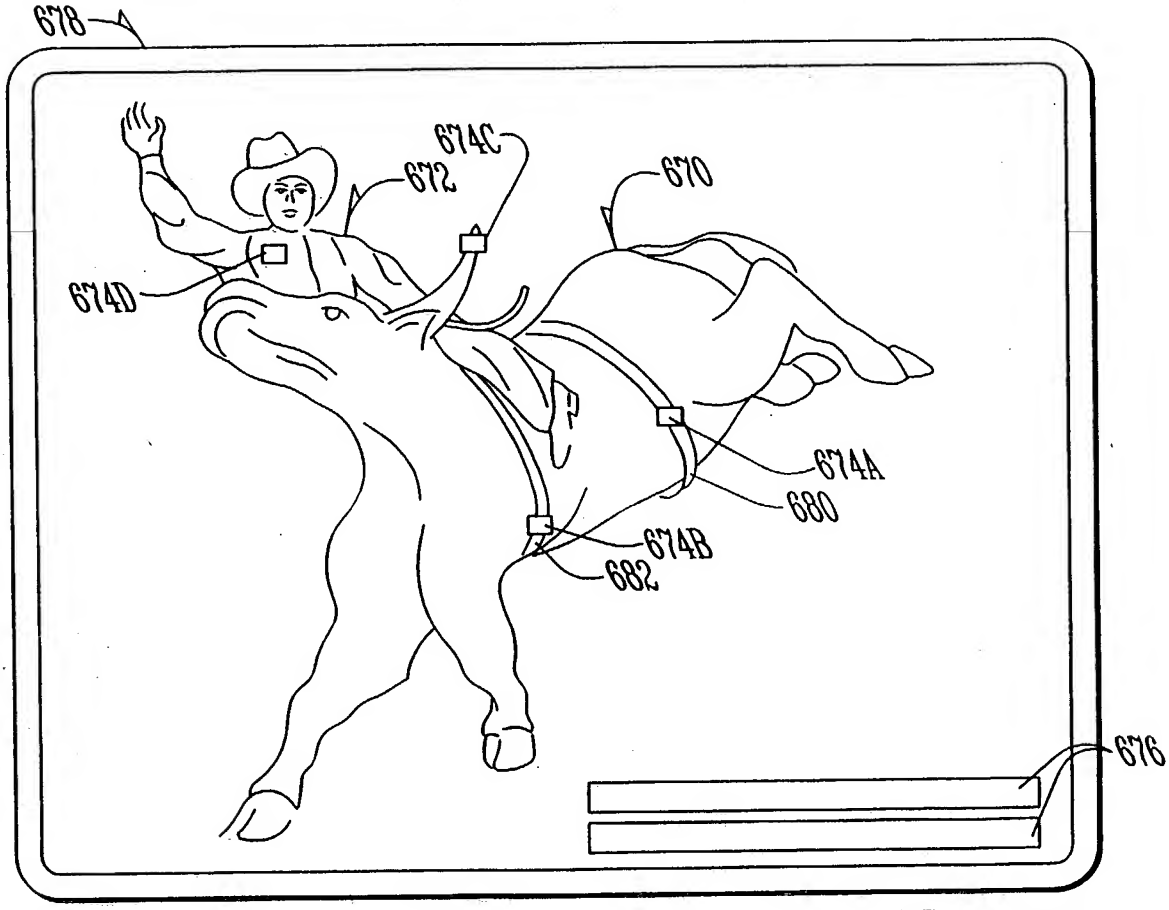

FIG.47

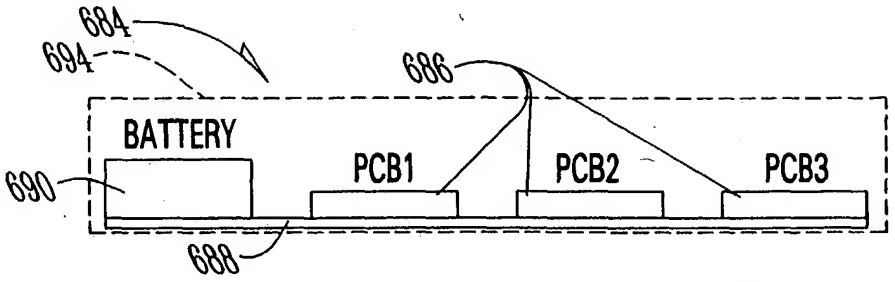
684
694
686
BATTERY
PCB1
PCB2
PCB3
690
688

FIG.48

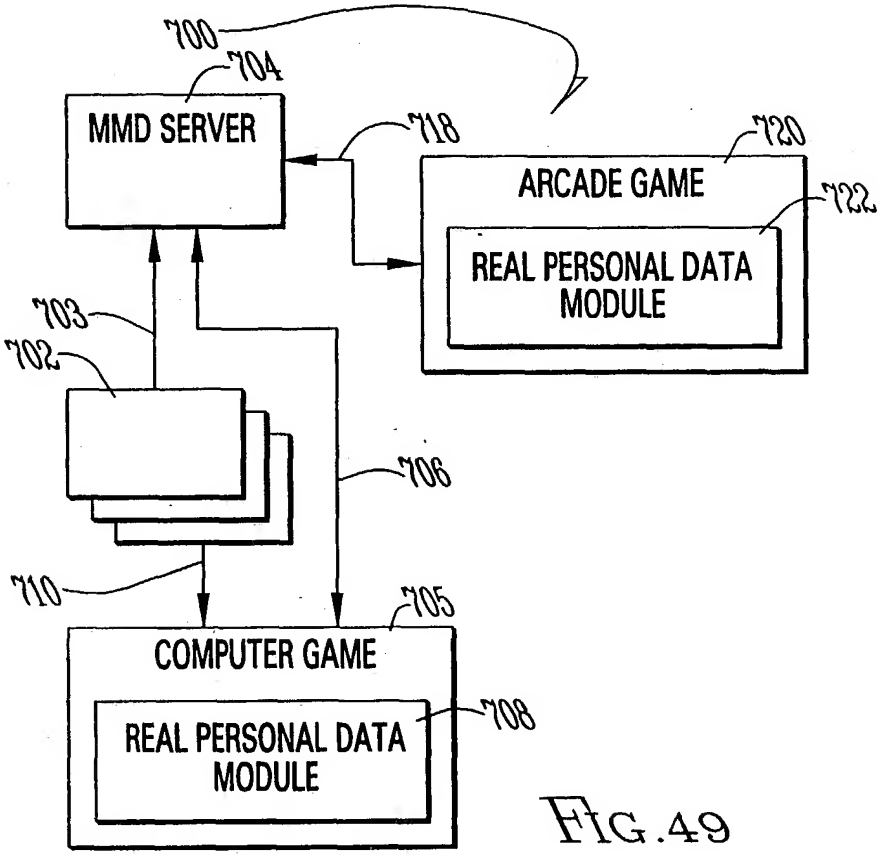
700
704
MMD SERVER
718
720
ARCADE GAME
722
REAL PERSONAL DATA MODULE
703
702
706
710
705
COMPUTER GAME
REAL PERSONAL DATA MODULE
708

FIG.49

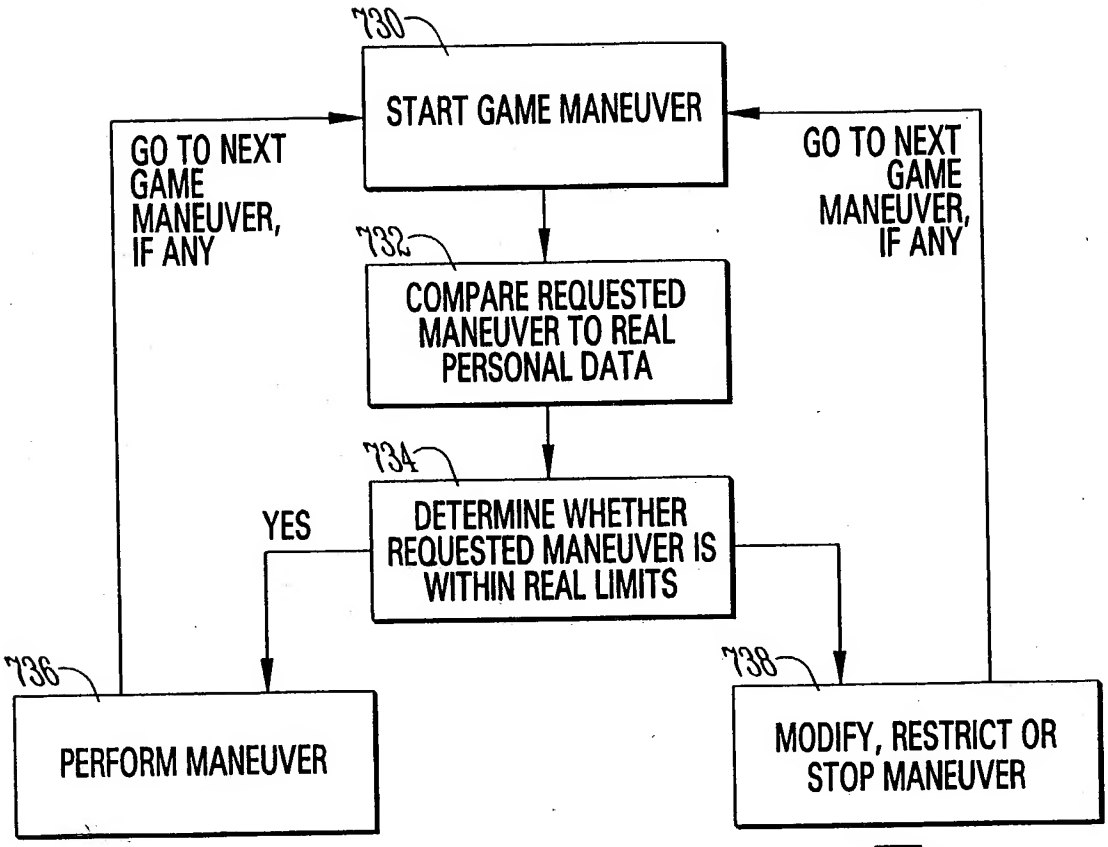
730
START GAME MANEUVER
GO TO NEXT GAME MANEUVER, IF ANY
GO TO NEXT GAME MANEUVER, IF ANY
732
COMPARE REQUESTED MANEUVER TO REAL PERSONAL DATA
734
DETERMINE WHETHER REQUESTED MANEUVER IS WITHIN REAL LIMITS
YES
736
PERFORM MANEUVER
738
MODIFY, RESTRICT OR STOP MANEUVER

FIG.50

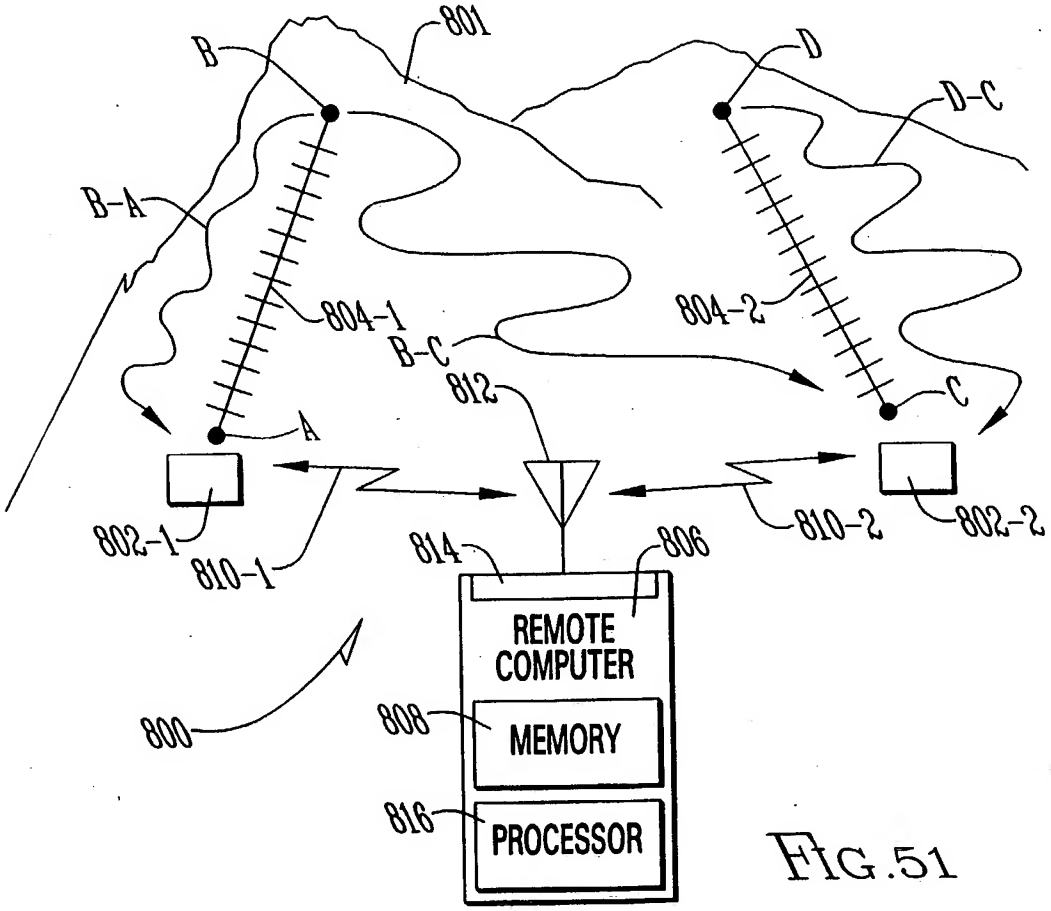
801
B
D
D-C
B-A
804-1
804-2
B-C
812
A
C
802-1
810-1
810-2
802-2
814
806
REMOTE COMPUTER
800
808
MEMORY
816
PROCESSOR

FIG.51

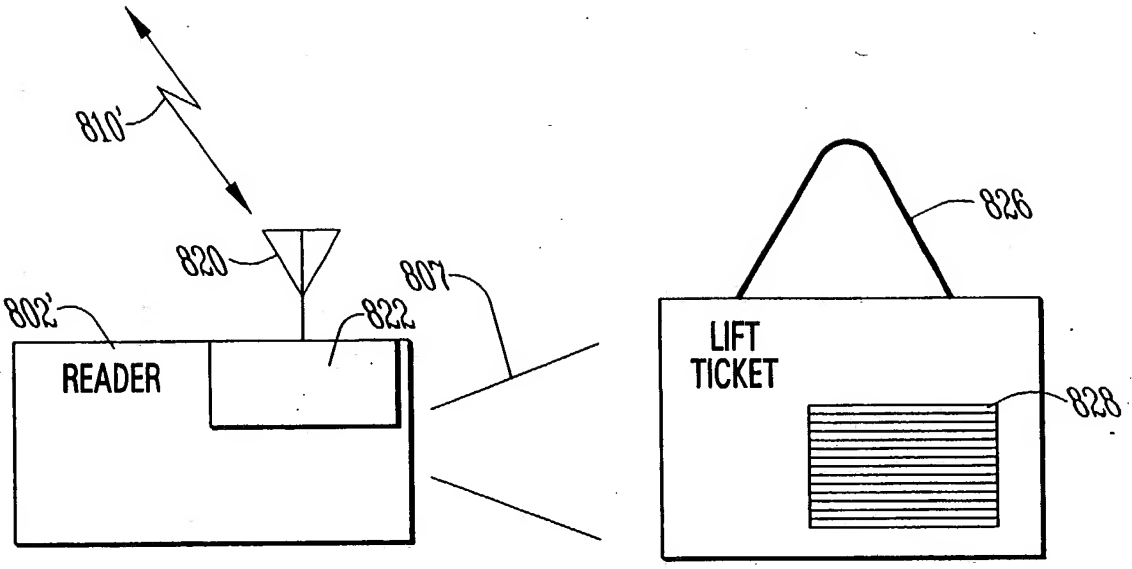
810'
820
807
802'
822
READER
826
LIFT
TICKET
828

FIG.52

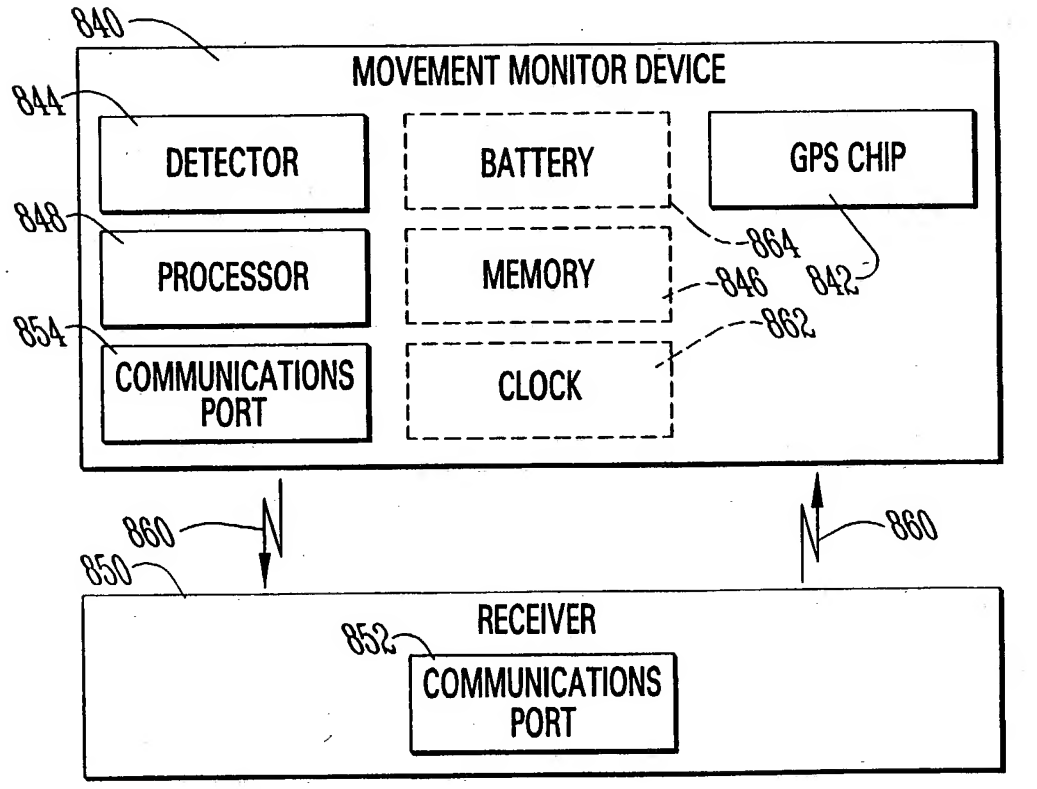
840
MOVEMENT MONITOR DEVICE
844
DETECTOR
BATTERY
GPS CHIP
848
PROCESSOR
MEMORY
854
COMMUNICATIONS PORT
CLOCK
864
842
846
862
860
860
850
RECEIVER
852
COMMUNICATIONS PORT

FIG.53

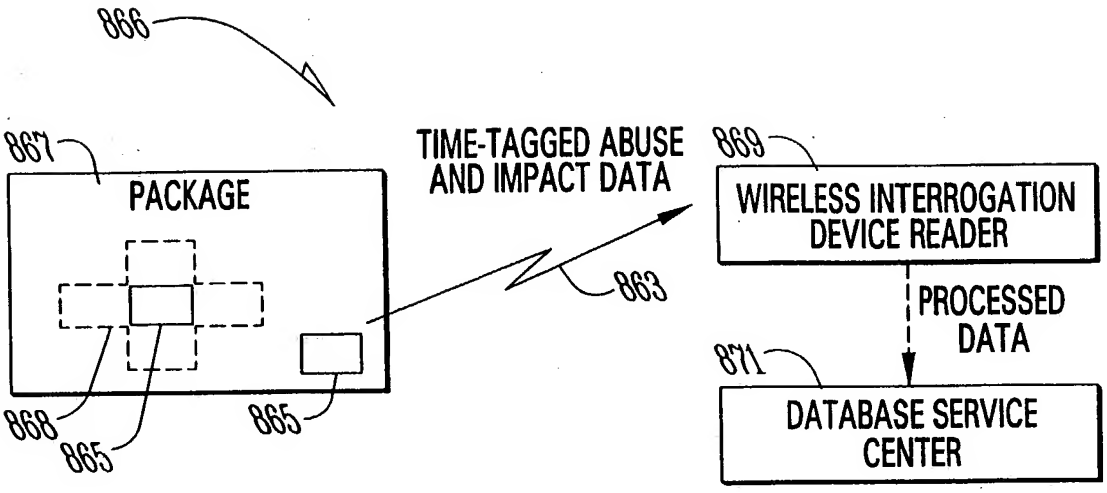
866
867
PACKAGE
868
865
865
TIME-TAGGED ABUSE AND IMPACT DATA
863
869
WIRELESS INTERROGATION DEVICE READER
PROCESSED DATA
871
DATABASE SERVICE CENTER

FIG.54

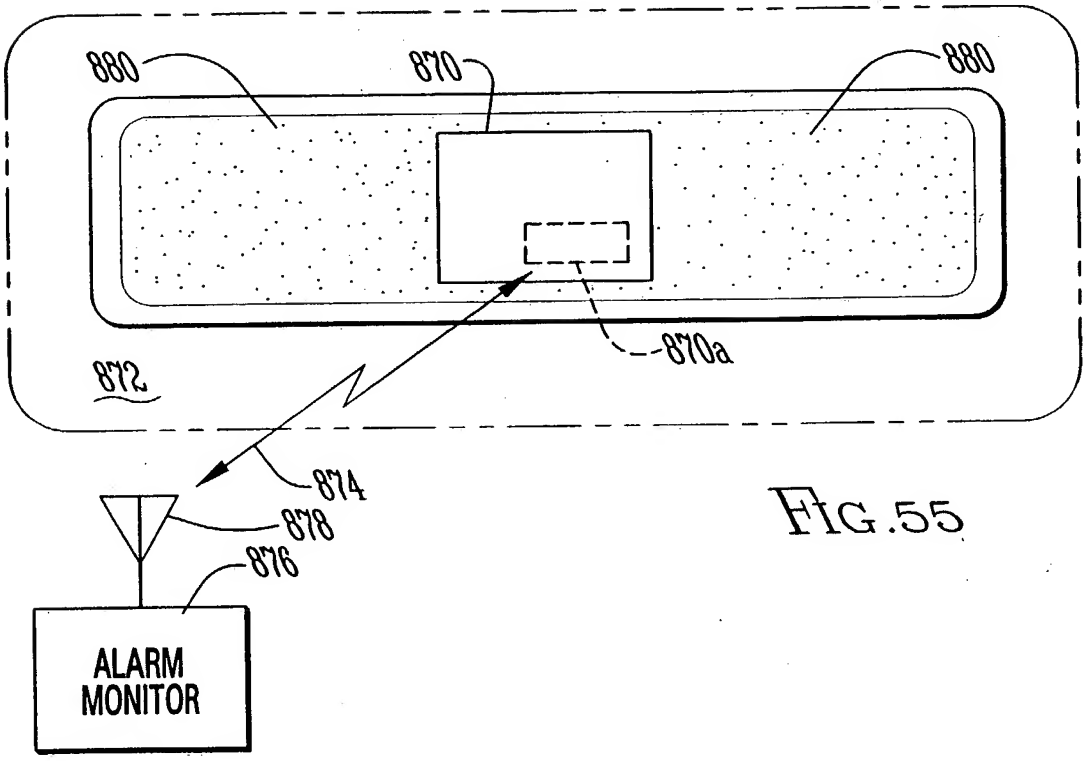
880
870
880
870a
872
874
878
876
ALARM MONITOR

FIG.55

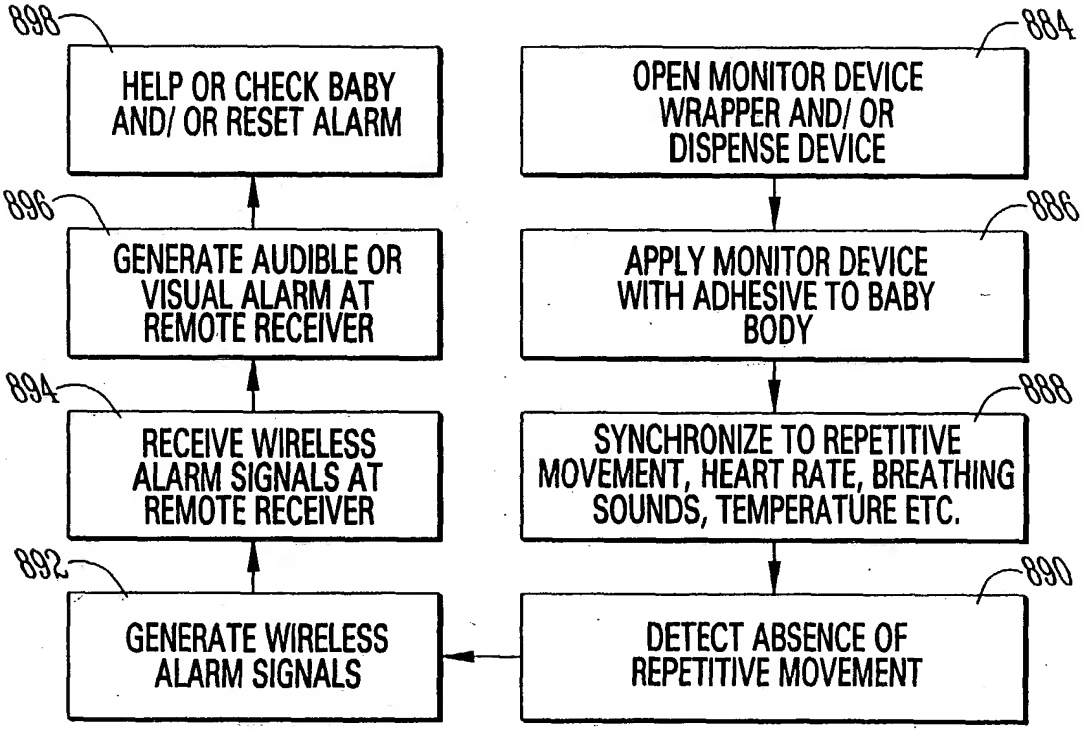
898
HELP OR CHECK BABY AND/ OR RESET ALARM
896
GENERATE AUDIBLE OR VISUAL ALARM AT REMOTE RECEIVER
894
RECEIVE WIRELESS ALARM SIGNALS AT REMOTE RECEIVER
892
GENERATE WIRELESS ALARM SIGNALS
884
OPEN MONITOR DEVICE WRAPPER AND/ OR DISPENSE DEVICE
886
APPLY MONITOR DEVICE WITH ADHESIVE TO BABY BODY
888
SYNCHRONIZE TO REPETITIVE MOVEMENT, HEART RATE, BREATHING SOUNDS, TEMPERATURE ETC.
890
DETECT ABSENCE OF REPETITIVE MOVEMENT

FIG.56

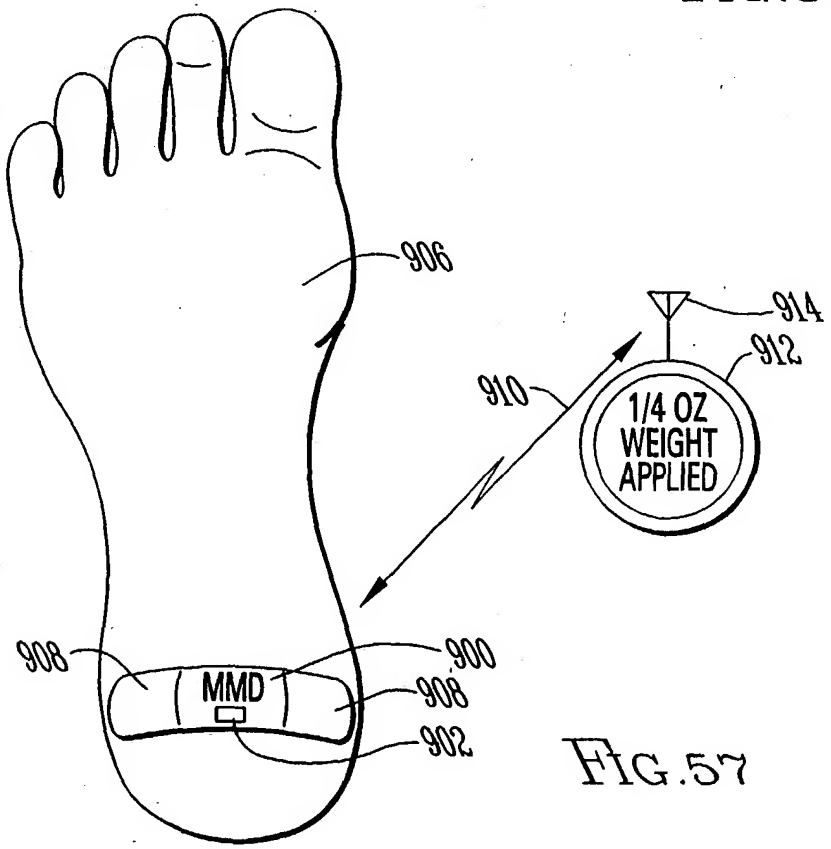
906
914
912
910
1/4 OZ WEIGHT APPLIED
908
MMD
900
908
902

FIG.57

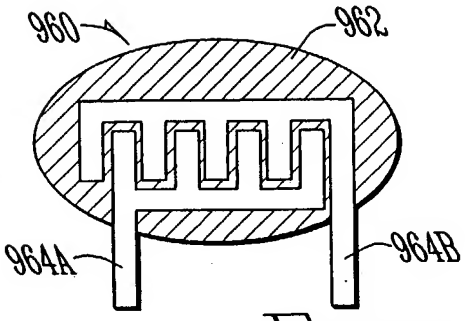

FIG.60

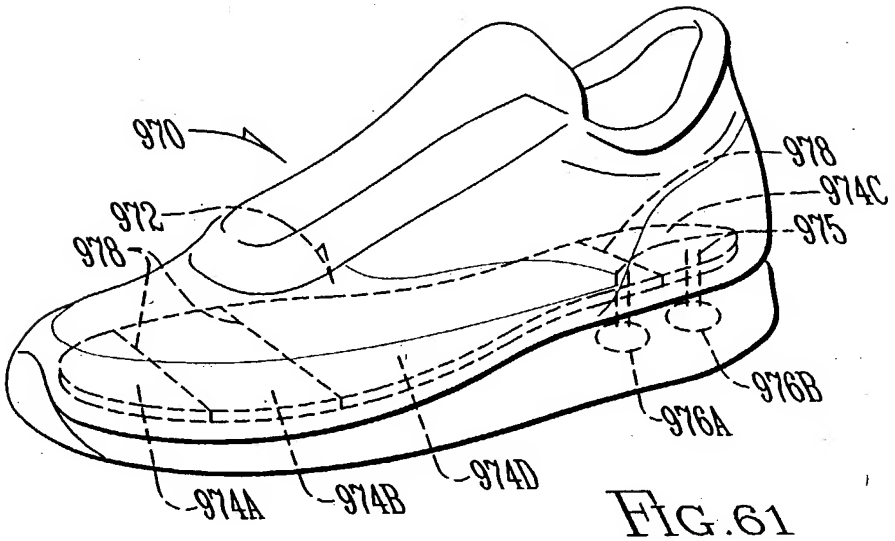

FIG.61

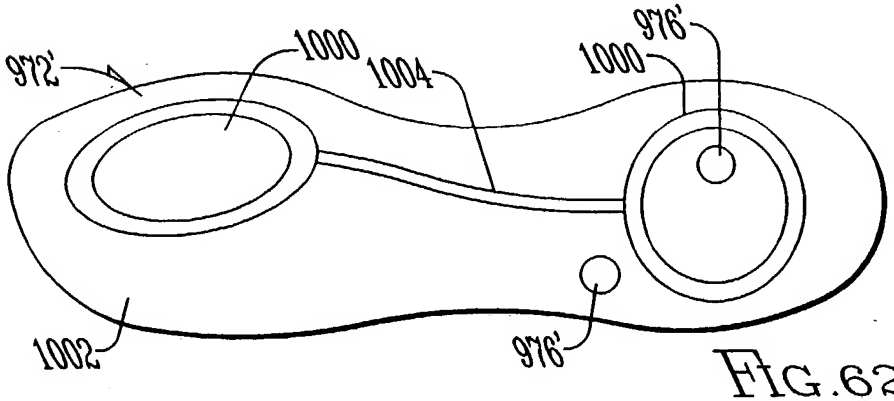

FIG.62

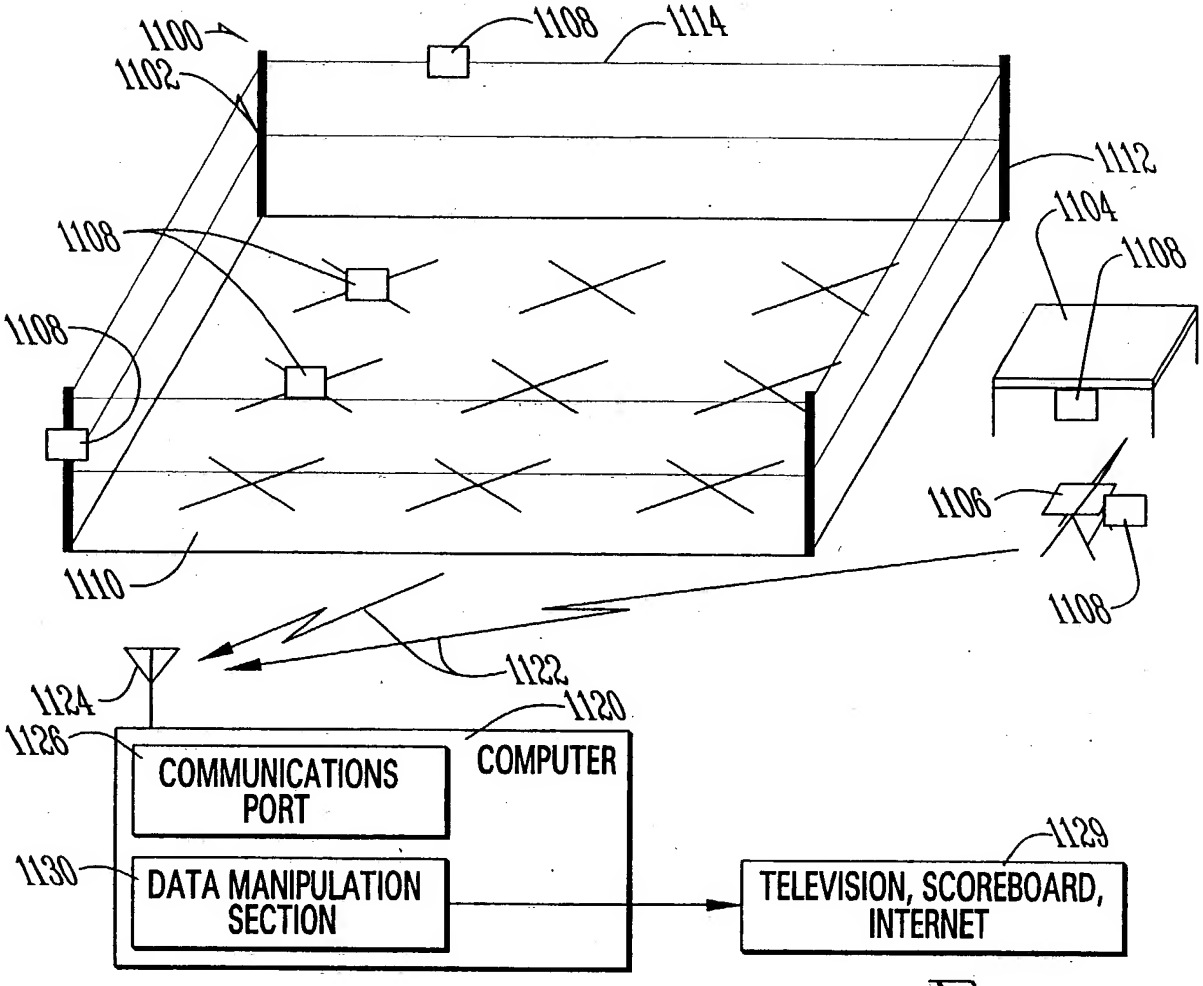
1100
1102
1108
1114
1112
1104
1108
1108
1108
1106
1110
1108
1122
1124
1120
1126
COMMUNICATIONS PORT
COMPUTER
1130
DATA MANIPULATION SECTION
1129
TELEVISION, SCOREBOARD, INTERNET

FIG.63

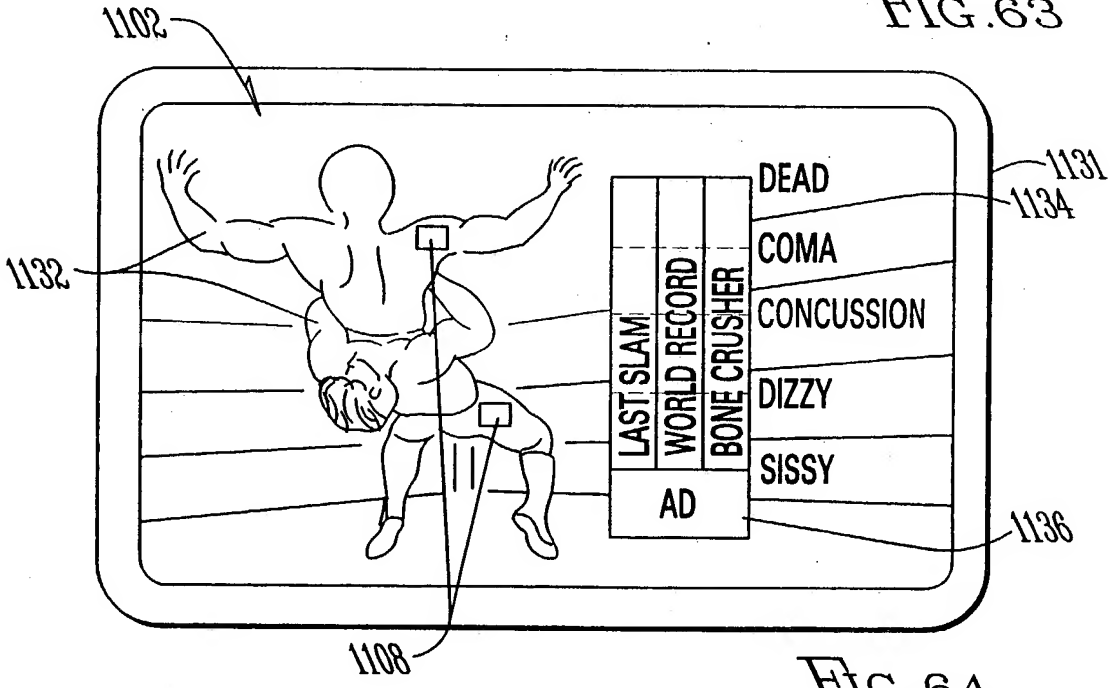
1102
1131
1134
1132
DEAD
COMA
CONCUSSION
DIZZY
SISSY
AD
LAST SLAM
WORLD RECORD
BONE CRUSHER
1136
1108

FIG.64

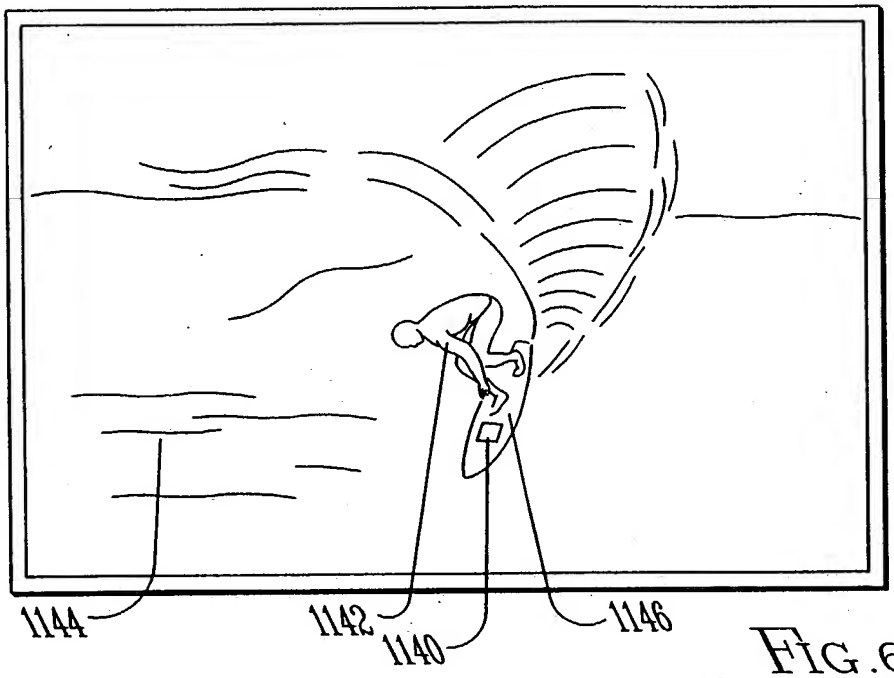

FIG.65

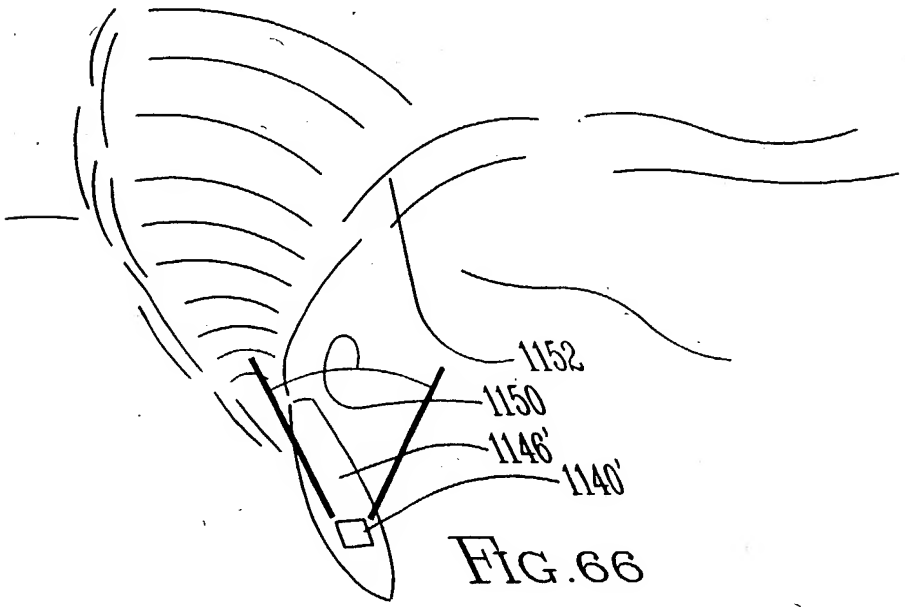

FIG.66

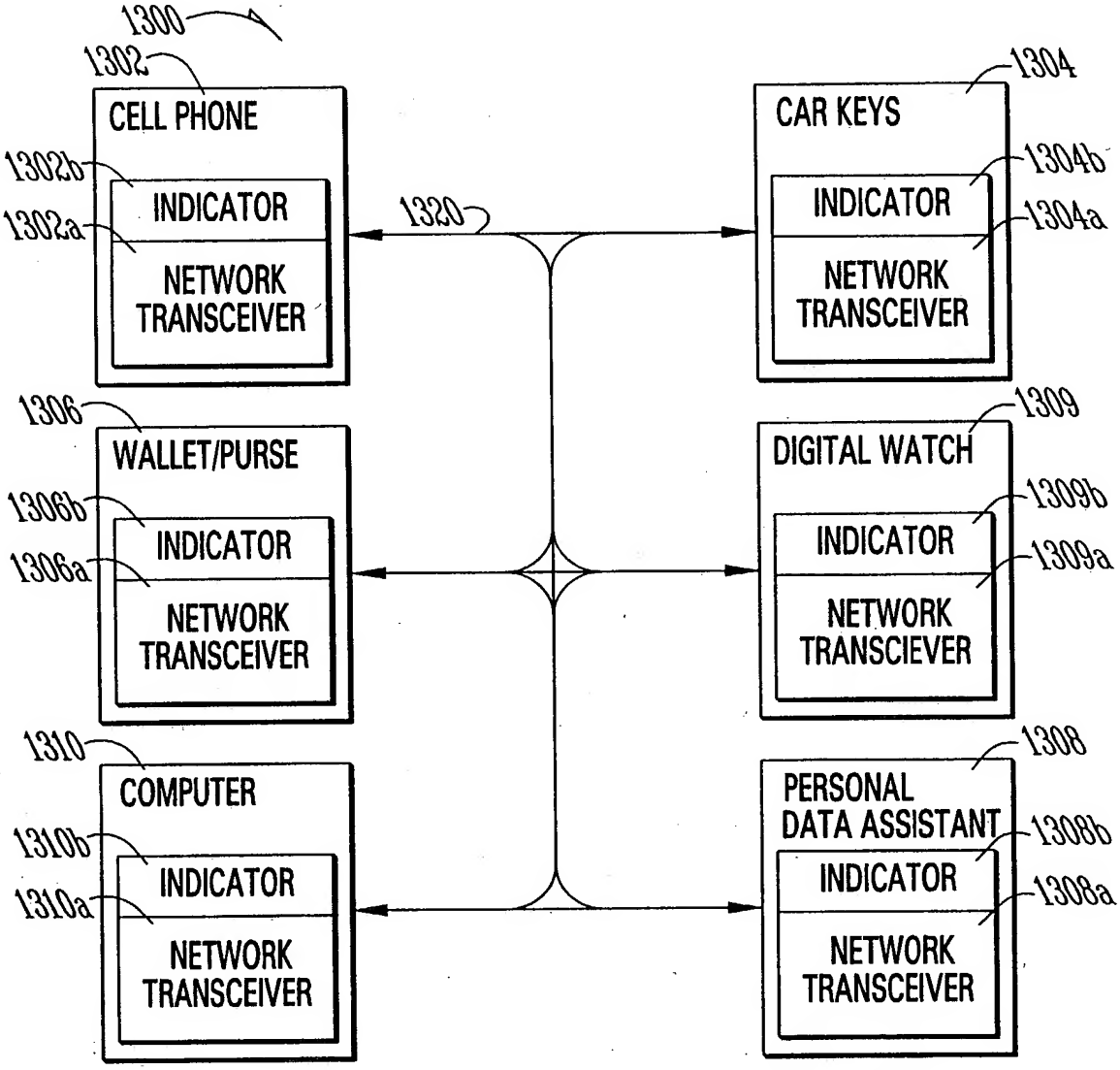
1300
1302
CELL PHONE
1302b
INDICATOR
1302a
NETWORK TRANSCEIVER
1320
1304
CAR KEYS
1304b
INDICATOR
1304a
NETWORK TRANSCEIVER
1306
WALLET/PURSE
1306b
INDICATOR
1306a
NETWORK TRANSCEIVER
1309
DIGITAL WATCH
1309b
INDICATOR
1309a
NETWORK TRANSCIEVER
1310
COMPUTER
1310b
INDICATOR
1310a
NETWORK TRANSCEIVER
1308
PERSONAL DATA ASSISTANT
1308b
INDICATOR
1308a
NETWORK TRANSCEIVER

FIG.67

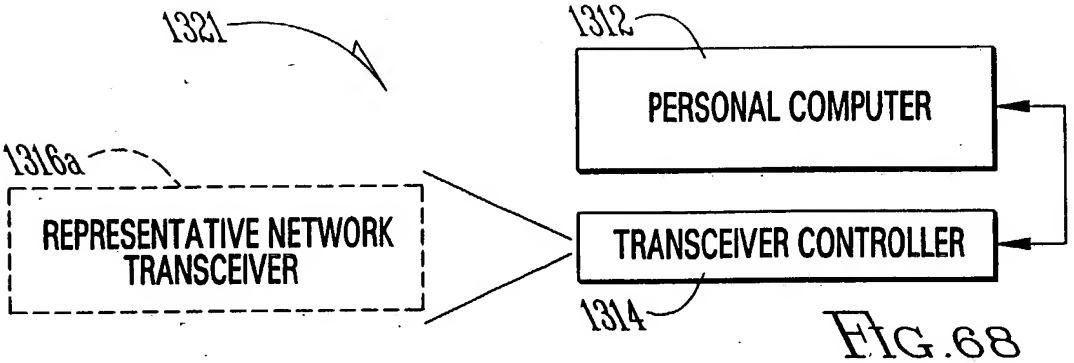
1321
1312
PERSONAL COMPUTER
1316a
REPRESENTATIVE NETWORK TRANSCEIVER
TRANSCEIVER CONTROLLER
1314

FIG.68

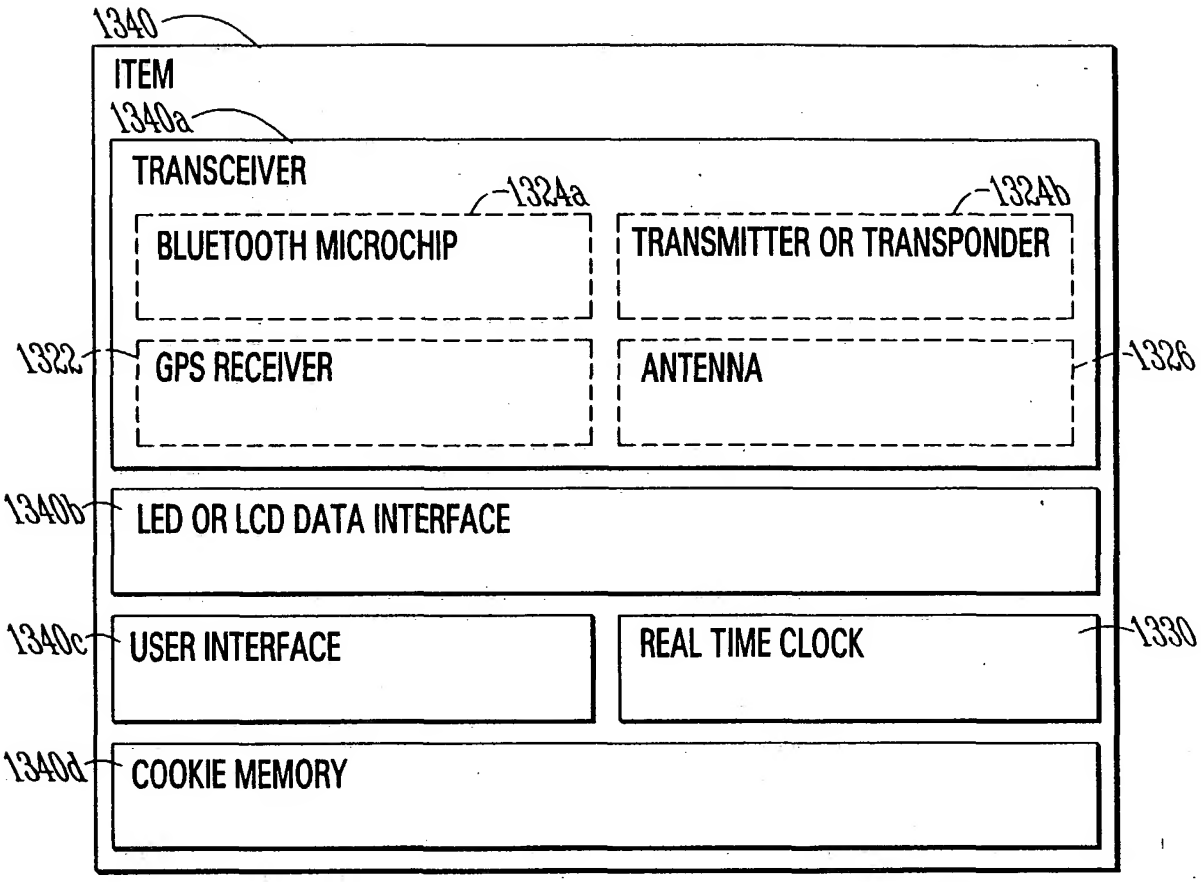
1340
ITEM
1340a
TRANSCEIVER
1324a
BLUETOOTH MICROCHIP
1324b
TRANSMITTER OR TRANSPONDER
1322
GPS RECEIVER
ANTENNA
1326
1340b
LED OR LCD DATA INTERFACE
1340c
USER INTERFACE
REAL TIME CLOCK
1330
1340d
COOKIE MEMORY

FIG.69

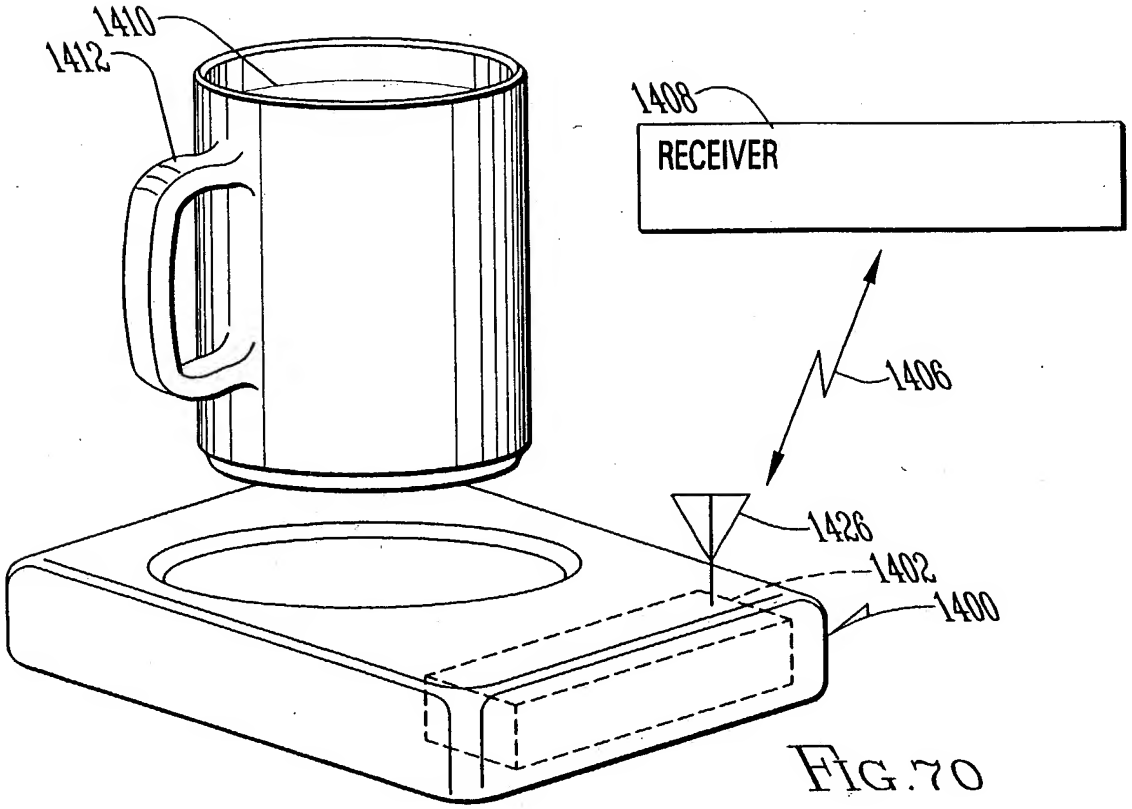
1410
1412
1408
RECEIVER
1406
1426
1402
1400

FIG.70

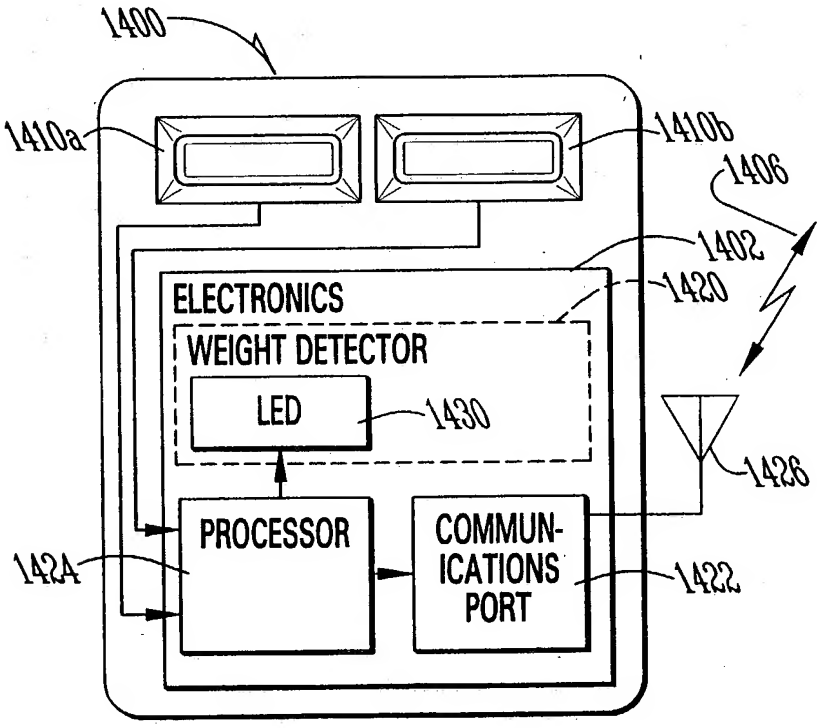
1400
1410a
1410b
1406
1402
ELECTRONICS
1420
WEIGHT DETECTOR
LED
1430
1426
PROCESSOR
COMMUN-
ICATIONS
PORT
1424
1422

FIG.71

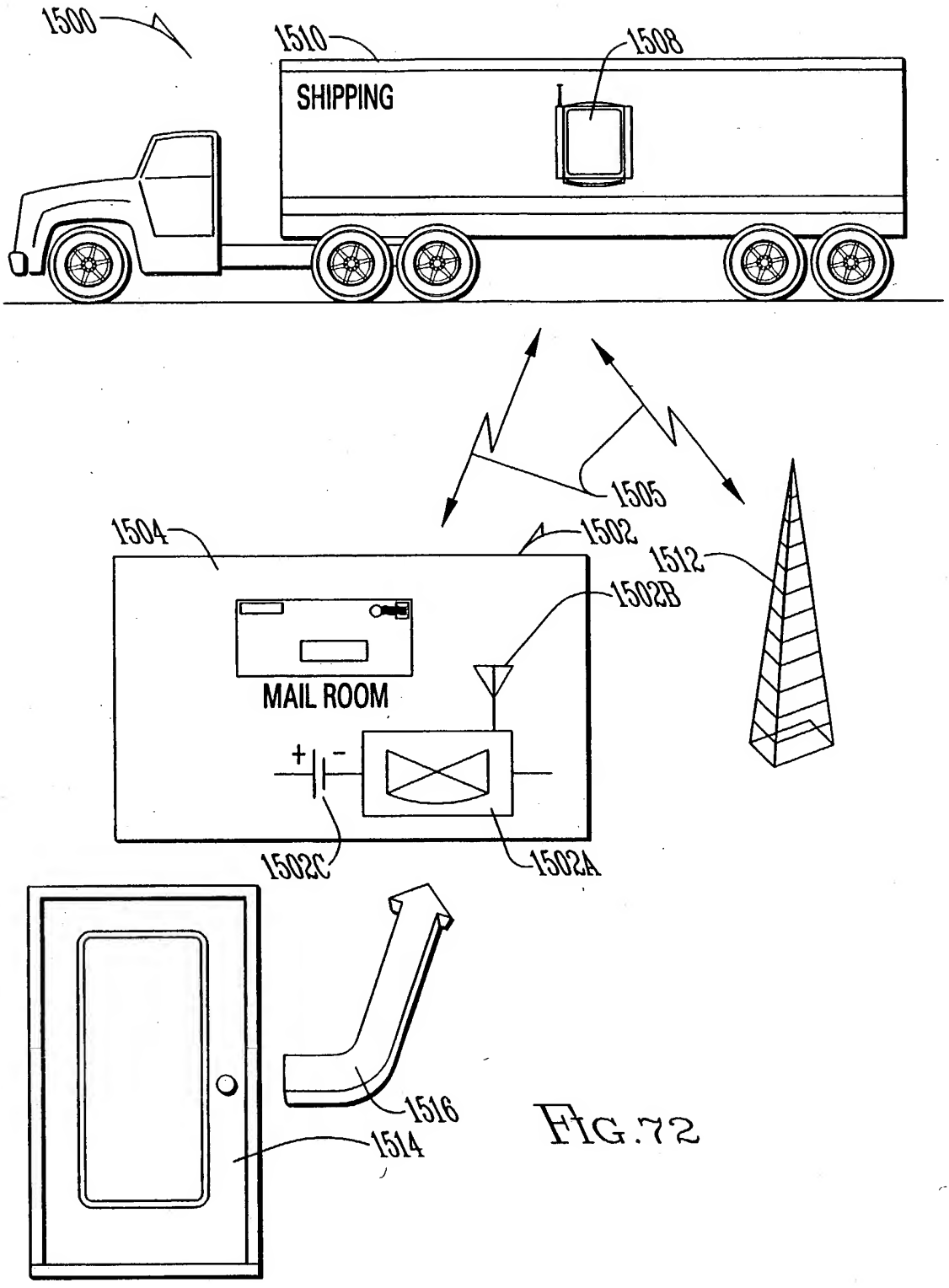
1500
1510
1508
SHIPPING
1505
1504
1502
1512
1502B
MAIL ROOM
+
-
1502C
1502A
1516
1514

FIG. 72

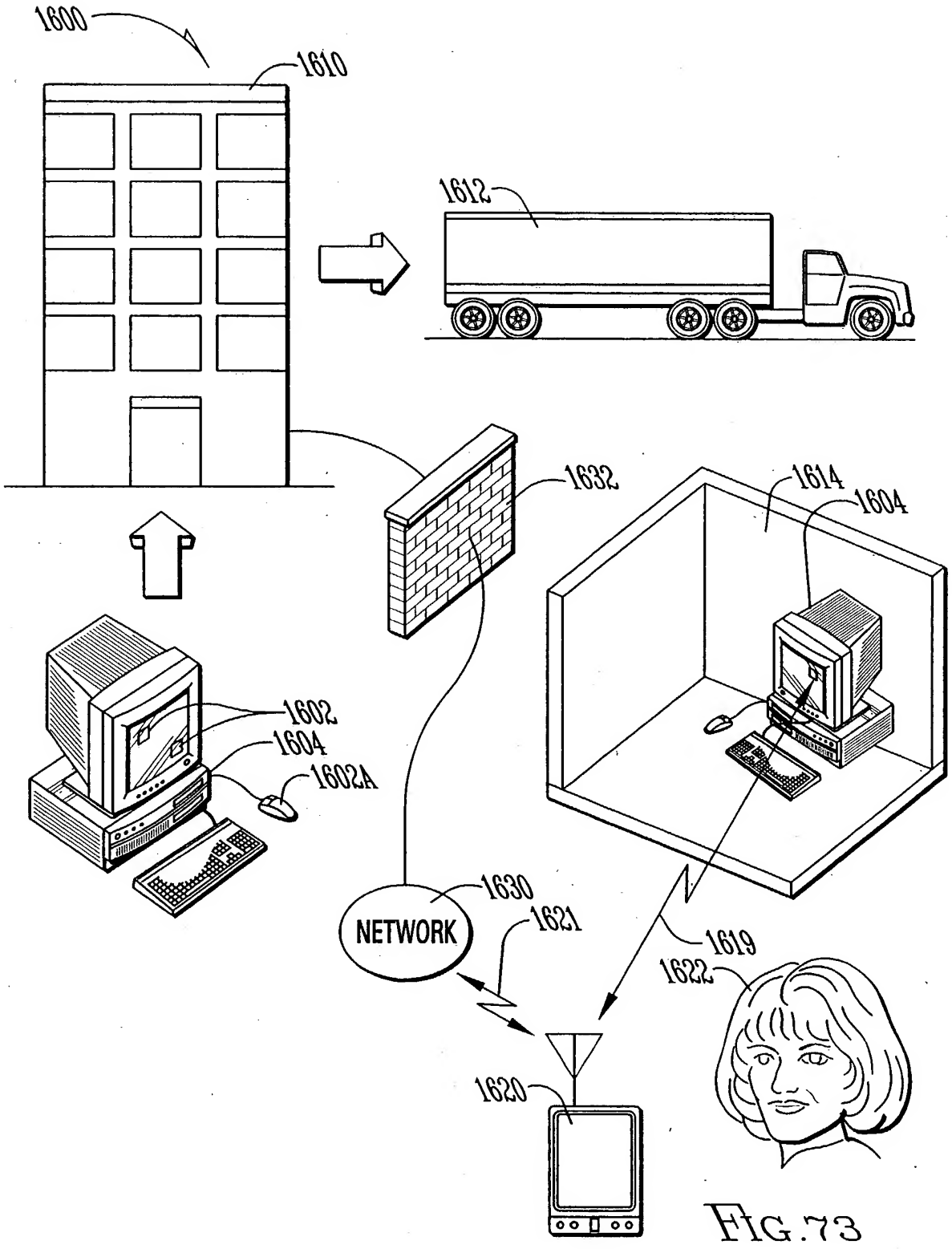
1600
1610
1612
1632
1614
1604
1602
1604
1602A
1630
NETWORK
1621
1619
1622
1620

FIG.73